U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

CORE LITHOLOGY
STATE OF HAWAII
SCIENTIFIC OBSERVATION HOLE 2
KILAUEA VOLCANO, HAWAII

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TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

The Scientific Observation Hole (SOH) project was initiated by the State of Hawaii through a contract with the Research Corporation of the University of Hawaii. It was a series of three deep cored holes, one in the middle east rift zone (MERZ) and two in the lower east rift zone (LERZ) of Kilauea volcano. The original core log sheets and drill core from all the SOH holes are now archived at the University of Hawaii at Manoa.

Scientific Observation Hole #2 (SOH#2) was spudded-in on February 3, 1991 and completed to a total depth of 2,075 m (6,802 ft) on May 29, 1991. The hole was located at an elevation of 85.4 m (280 ft) in the Kapoho area of the LERZ (Figure 1).

LITHOLOGIC SUMMARY

Due to difficult drilling, conditions and cost overruns encountered in SOH#1, it was decided to rotary drill SOH#2 to a depth of 582 m (1,909 ft). The hole was then core drilled to 623 m (2,044 ft) where rapidly deteriorating drilling conditions forced a return to rotary drilling. Core drilling was again attempted at 849 m (2,785 ft) and suspended at 863 m (2,830 ft). Coring was finally resumed at 1,253 m (4,108 ft) and continued uninterrupted to the end of the hole at 2,075 m (6,802 ft).

During rotary drilling cuttings were recovered from 119 m (390 ft) to 134 m (441 ft) and from 311 m (1,019 ft) to 515 m (1,689 ft). Cuttings from both these intervals contain unaltered basalts with hematite-stained vesicles, thermally altered basalts, and large amounts of orange cinder. These features indicate that the cuttings originated as subaerial lava flows and airborne near-vent deposits.

When core drilling commenced at 582 m (1,909 ft), the first unit encountered was a submarine pillow basalt. The change from subaerial deposits at 515 m (1,689 ft) to submarine pillow lavas at 582 m (1,909 ft) places the subaerial / submarine interface somewhere in this ~60 m (200 ft) interval. Pillow lavas and hyaloclastites alternate from 582 m (1,909 ft) to a depth of 607 m (1,990 ft). Below 607 m (1,990 ft), pillow lavas with 10% plagioclase phenocrysts, some altered black in color, continue to a depth of 623 m (2,044 ft), where their extremely fractured, unconsolidated condition forced a return to rotary drilling. No dikes were recorded in this section of core.

When core drilling resumed at 849 m (2,785 ft), pillow lavas encountered were nonvesicular with 5-7% olivine phenocrysts and 2% plagioclase phenocrysts altered black in color. The basaltic groundmass is patchily altered to smectite clay. This lithology continues until core drilling was again suspended at 863 m (2,830 ft). No dikes were recorded in this section of core.

Rotary cuttings were again obtained from 1,132 m (3,711 ft) to 1,252 m (4,104 ft). These are very fine-grained, gray-green clays with the exception of an interval between 1,225 m (4,018 ft) and 1,234 m (4,045 ft) where unaltered basalt predominates. This change in lithology probably represents the intrusion of a dike into hydrothermally altered hyaloclastites.

At 1,255 m (4,114 ft) core drilling was resumed. The units encountered are vesicular pillow lavas altered to smectite to a depth of 1,267 m (4,155 ft). Below this, an extremely thick hyaloclastite deposit altered to smectite reaches a depth of 1,333 m (4,370 ft). Beyond this depth

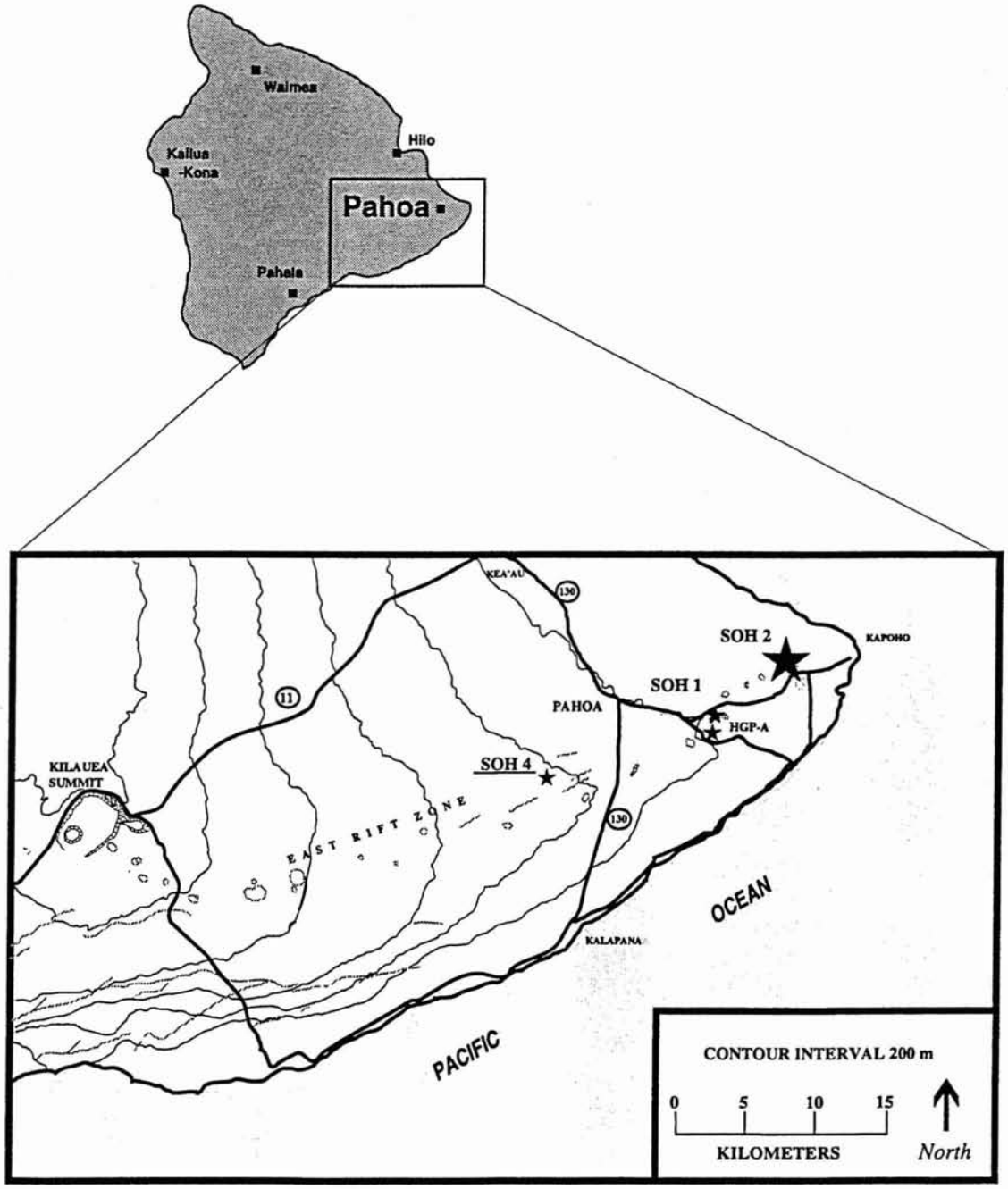


Figure 1: Site location map for Scientific Observation Holes.

hyaloclastites do not occur as massive units but fill the interstices between individual pillows and form thin units at the borders of pillow lava formations.

The pillow lavas themselves form at least seven distinct units 60 m (200 ft) to 90 m (300 ft) thick. These units are distinguishable from each other by differences in olivine and plagioclase phenocryst percentages and differences in the volume of vesiculation. The pillows within these units range in diameter from a few centimeters to 10 m (30 ft), with an average diameter of 0.5 m (1.6 ft).

All of these pillow units are sparsely phyric with 1-5% olivine and/or plagioclase phenocrysts. Exceptions are a small pillow lava unit encountered between 1,507 m (4,941 ft) and 1,530 m (5,081 ft), which has 15% plagioclase phenocrysts, and a large picritic pillow lava unit encountered at 1,935 m (6,343 ft) which continues to the bottom of the hole. This unit contains up to 30% olivine phenocrysts, fairly unaltered, in a groundmass completely altered to smectite. Hydrothermal alteration of the basaltic pillow groundmass to smectite is most intense as an aureole around large dikes, but is present where no dikes were recorded in the core.

Vesiculation in the pillow lavas varies between 30% by volume and 1 mm in diameter in a unit at 1,611 m (5,282 ft) to 1,648 m (5,405 ft) depth, to completely nonvesicular. One unit encountered from 1,763 m (5,780 ft) to 1,843 m (6,043 ft) depth contains vesiculation packages which are 15% by volume and 1 mm diameter in the top third of the pillows, nonvesicular in the middle third, and contain pipe vesicles 2-3 mm in diameter and 1-2 cm long in the bottom third.

Ninety-eight dikes were recorded in SOH#2 cores between 1,253 m (4,108 ft) and the bottom of the hole at 2,075 m (6,802 ft) (Figure 2). All are sparsely phyric except the largest, which extends from 1,433 m (4,700 ft) to 1,489 m (4,882 ft) with a dip of 55^0 from a horizontal drawn across the core, making it 32 m (104 ft) thick in cross section. This dike contains up to 30% plagioclase phenocrysts near its margins and grades to holocrystalline gabbro at its core. Large dikes in the submarine portion of SOH#2 cores are planar bodies, but small dikelets intrude along pillow lava margins and fill the interstices between pillows.

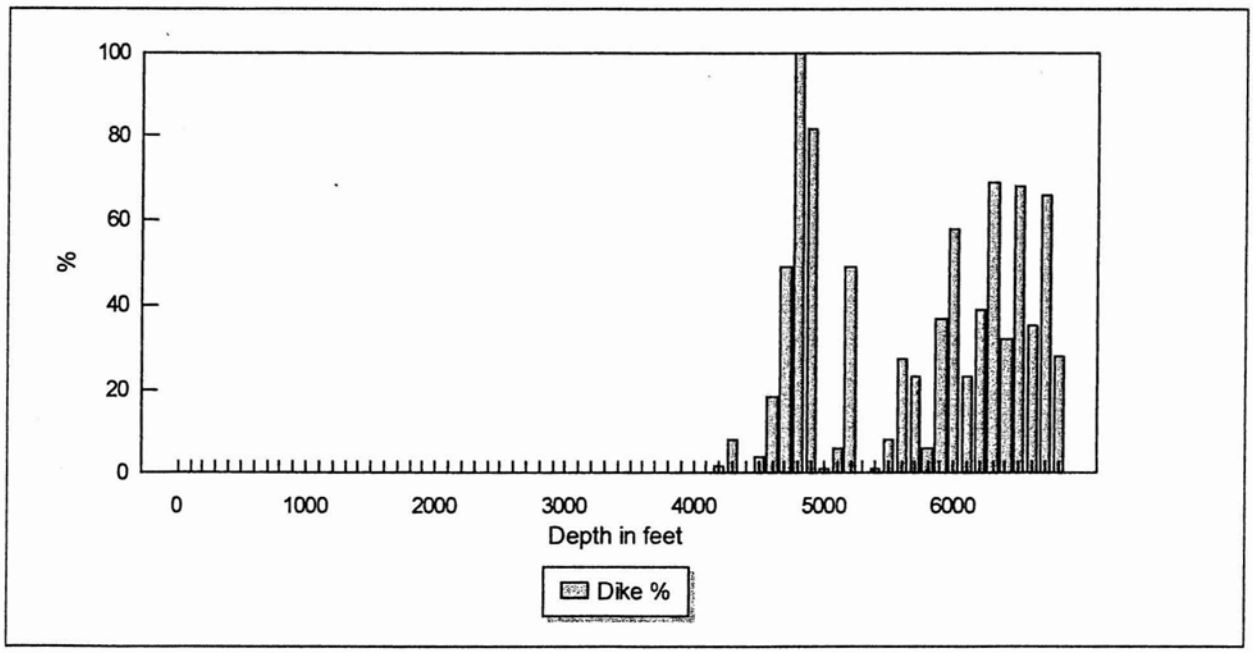


Figure 2. Percent of core composed of dike material averaged per 100 feet.

Secondary hydrothermal mineralization in SOH#2 is predominantly fracture fill with some accumulation in vesicles and vugs. Hematite first appears at 359 m (1,177 ft) as a vesicle stain and is continuous to 512 m (1,679 ft). Calcite appears at 383 m (1,255 ft) and is common to the bottom of the hole. Gypsum appears at 386 m (1,265 ft) and anhydrite at 1,255 m (4,018 ft); both are common to 1,954 m (6,408 ft). From 1,347 m (4,416 ft) to 1,400 m (4,591 ft), massive gypsum and/or anhydrite occasionally forms the matrix for pillow breccias. A blue clay stain, ubiquitous in shallower portions of the other SOH holes, is found from 500 m (1,639 ft) to 623 m (2,042 ft). Pyrite first appears at 591 m (1,937 ft) but is not common until 1,210 m (3,968 ft) and is ubiquitous from this depth to the bottom of the hole. Smectite starts at 623 m (2,042 ft) and coats nearly every fracture below this depth. From 1,201 m (3,938 ft) to 1,249 m (4,094 ft), orange iron oxide agglomerations, which appear to be altered olivine phenocrysts, are common in drill cuttings. White fibrous zeolites become common below 1,263 m (4,142 ft), and analcime first occurs at 1,295 m (4,247 ft). Euhedral quartz crystals appear at 1,243 m (4,075 ft) and are common to the bottom of the hole. Epidote makes rare appearances below 1,820 m (5,969 ft) and pyrrhotite below 1,975 m (6,475 ft).

Rock Quality Designation (RQD), which is a percentage measure of rock competency determined by the total length of core segments over 10 cm long in the box divided by the total length of core in the box, is uniformly high in the cored portion of the hole from 1,253 m (4,108 ft) to 2,075 m (6,802 ft). It falls below 50% in only five intervals; from 1,250 m (4,100 ft) to 1,281 m (4,200 ft), from 1,464 m (4,800 ft) to 1,525 m (5,000 ft), from 1,616 m (5,300 ft) to 1677 m (5,500 ft), from 1,952 m (6,400 ft) to 1,982 m (6,500 ft), and from 2,013 m to (6,600 ft) to 2,075 m (6,800 ft) (Figure 3).

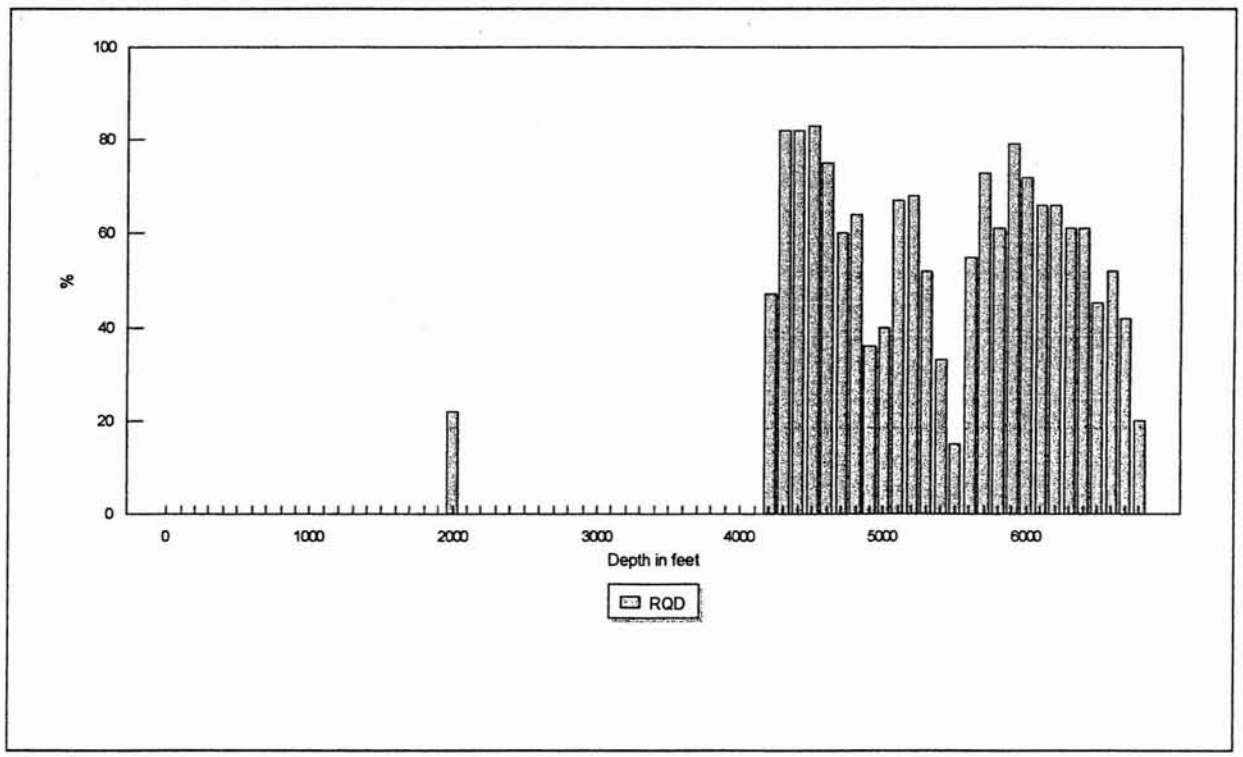


Figure 3. RQD averaged per 100 feet.

A temperature survey was made on the SOH#2 hole on June 6, 1991, eight days after the completion of drilling. The depth interval from 61 m to 1,815 m (200 to 5,950 ft) was logged by USGS wire line, and the interval from 1,830 m to 2,068 m (6,000 to 6,781 ft) by Pruett wire line. This survey is presented in graphic format in Figure 4.

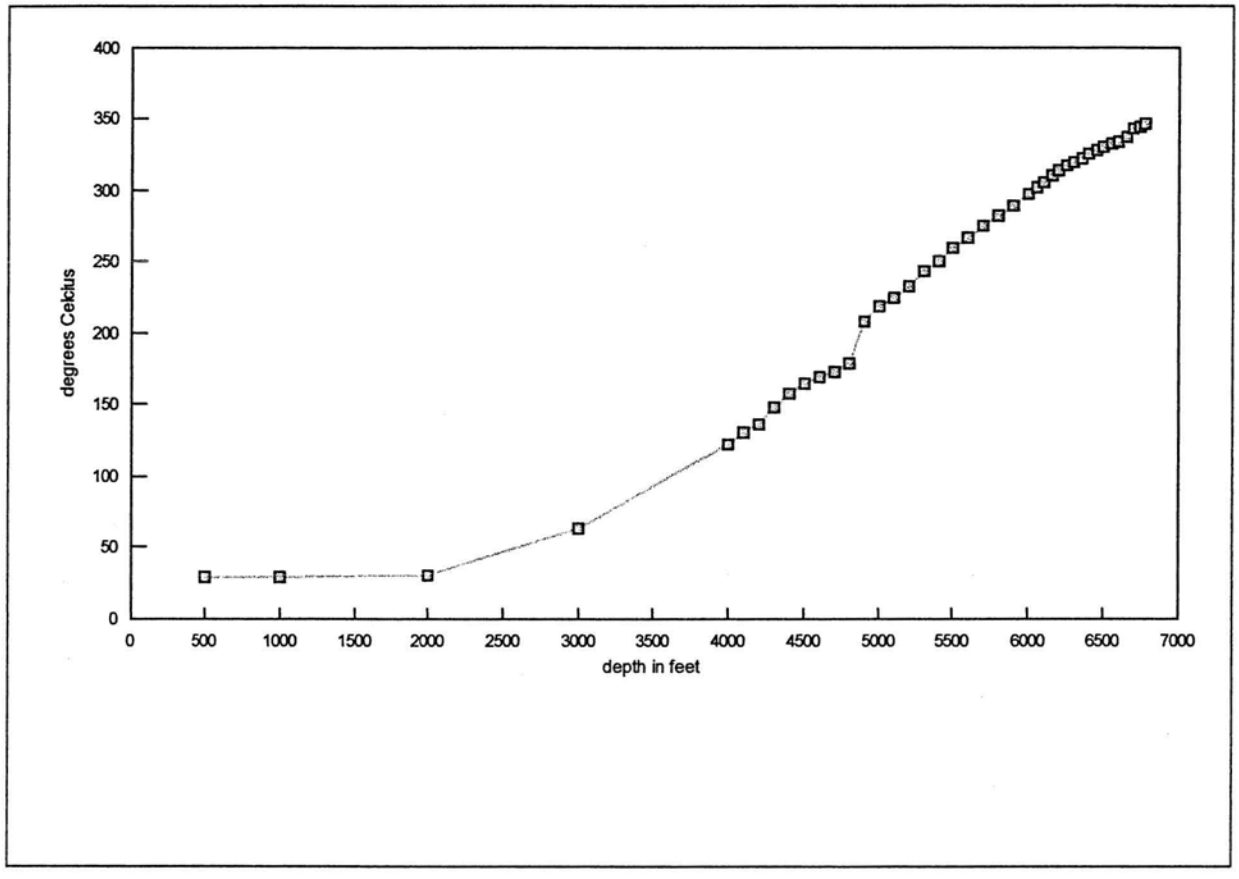


Figure 4. SOH#2 temperature survey June 6, 1991.

CHIP AND CORE CATALOG KEY

This document presents data from the original chip log and core log sheets, and temperature surveys in the hole in graphic format. Its purpose is to serve as a catalog and reference to the drill chips and core.

Chip recovery in the rotary drilled upper section of the hole averaged only 28%. However, core recovery in the continuously cored section of the hole below 4,108 feet averaged 99.18%.

Figure 5 is a sample chip log. The first two columns on the left are depth in feet and the number of the bag containing chips from this depth interval. The third column presents data from the temperature survey run on June 6, 1991. The next column notes the presence of matrix and secondary hydrothermal alteration minerals in the chip bag by a diagonally hatched bar. The fifth column presents the percentages of chips of various lithologies in the bag. The sixth column is a symbolic representation of the morphology of the dominant unit in the bag interpreted from the lithologies of the chips. The last column is a short description of this unit. For example, a bag which contained 85% aphanitic basalt chips with 2-3% olivine phenocrysts and 15% red cinder would be represented symbolically by the subaerial flow symbol and would be described in the last column as an aphanitic, sparsely phyric subaerial flow.

Figure 6 is a sample core log. The first two columns on the left are depth in feet and the number of the box containing core from this depth interval. The third column presents data from the same temperature survey discussed above. The next column notes the presence of matrix and secondary hydrothermal alteration minerals in the core box by a diagonally hatched bar. The fifth column, RQD, notes the percentage of core segments over 10 cm long in the core box. The sixth column is a symbolic representation of the morphology of the dominant unit in the box. The last column, which has been condensed from the text of the original core logs, is a description of the morphology and lithology of all the units present in the box. It starts with the numbers of the units as they occur in downward sequence through the box, then gives the morphological name of the unit or units, the percentage of vesicles present by volume and their diameter, the type of phenocrysts present and their percentages by volume, a textural description of the units, their thickness in centimeters and, if the unit is a dike, its contact angle with the previous unit in degrees from horizontal. Hydrothermal alteration minerals listed in upper case letters are keyed to the graphic format of the fourth column, those in lower case letters do not appear in the fourth column. Minerals preceded by "XRD:" are identified by x-ray diffraction at the University of Hawaii at Manoa.

ACKNOWLEDGMENTS

The data presented here were obtained while we worked on the Scientific Observation Hole project. We would like to thank Dr. Harry Olson and Dr. Don Thomas for giving us the opportunity to work on this exciting project. And, we would like to thank Dr. Martha Sykes and Dr. Terry Keith for providing XRD identification of and information on hydrothermal alteration minerals in the chips and core.

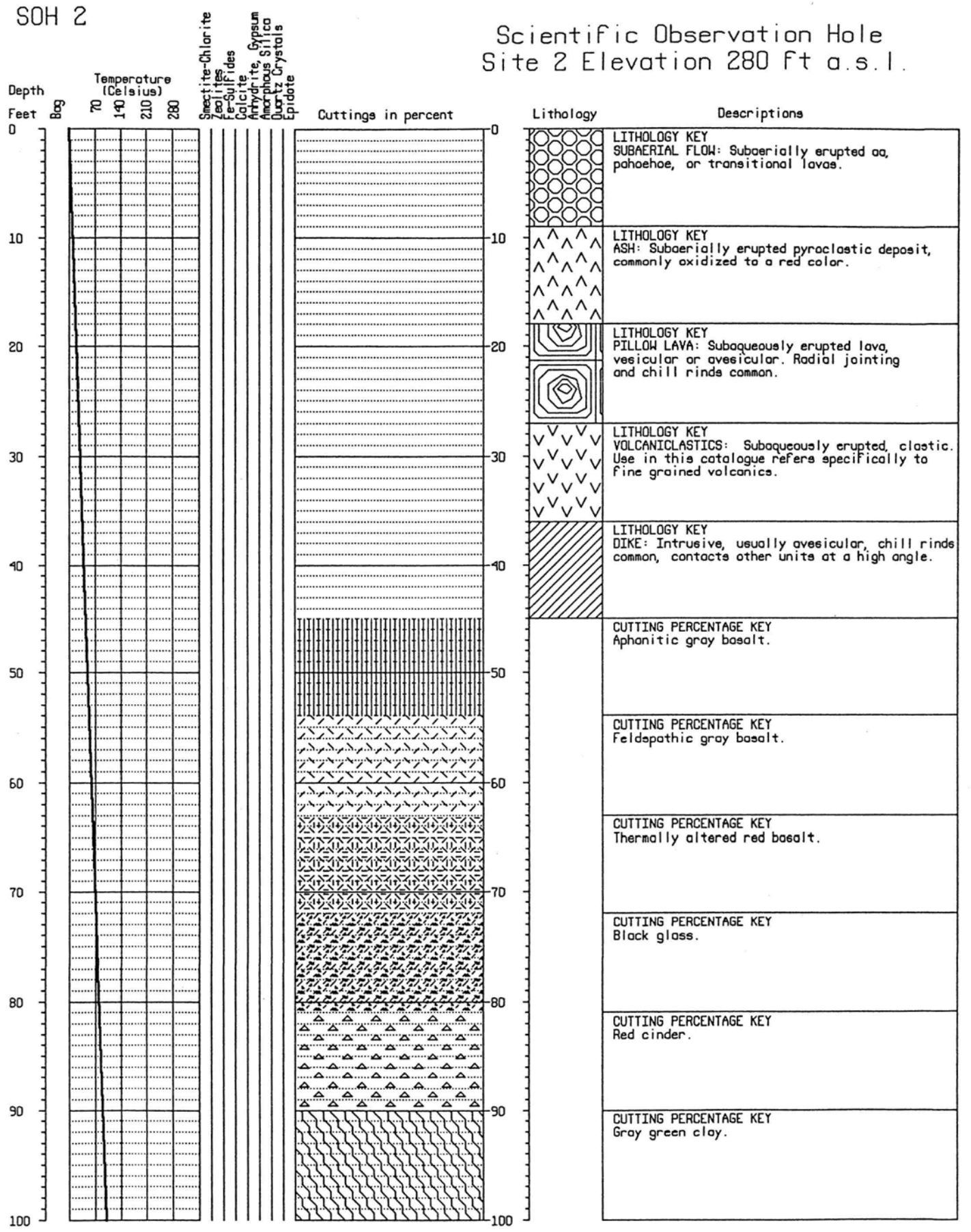


Figure 5. Sample chip log.

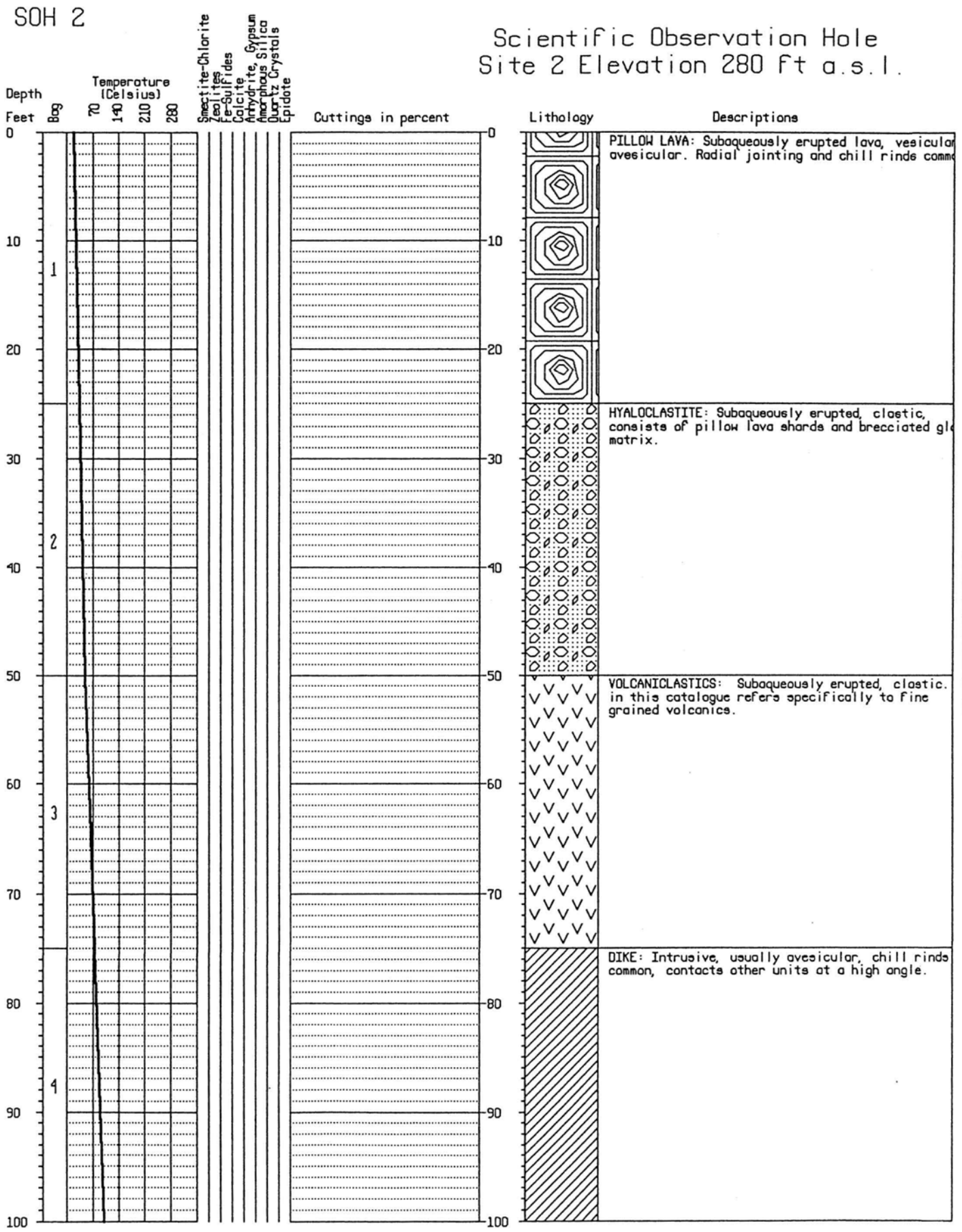


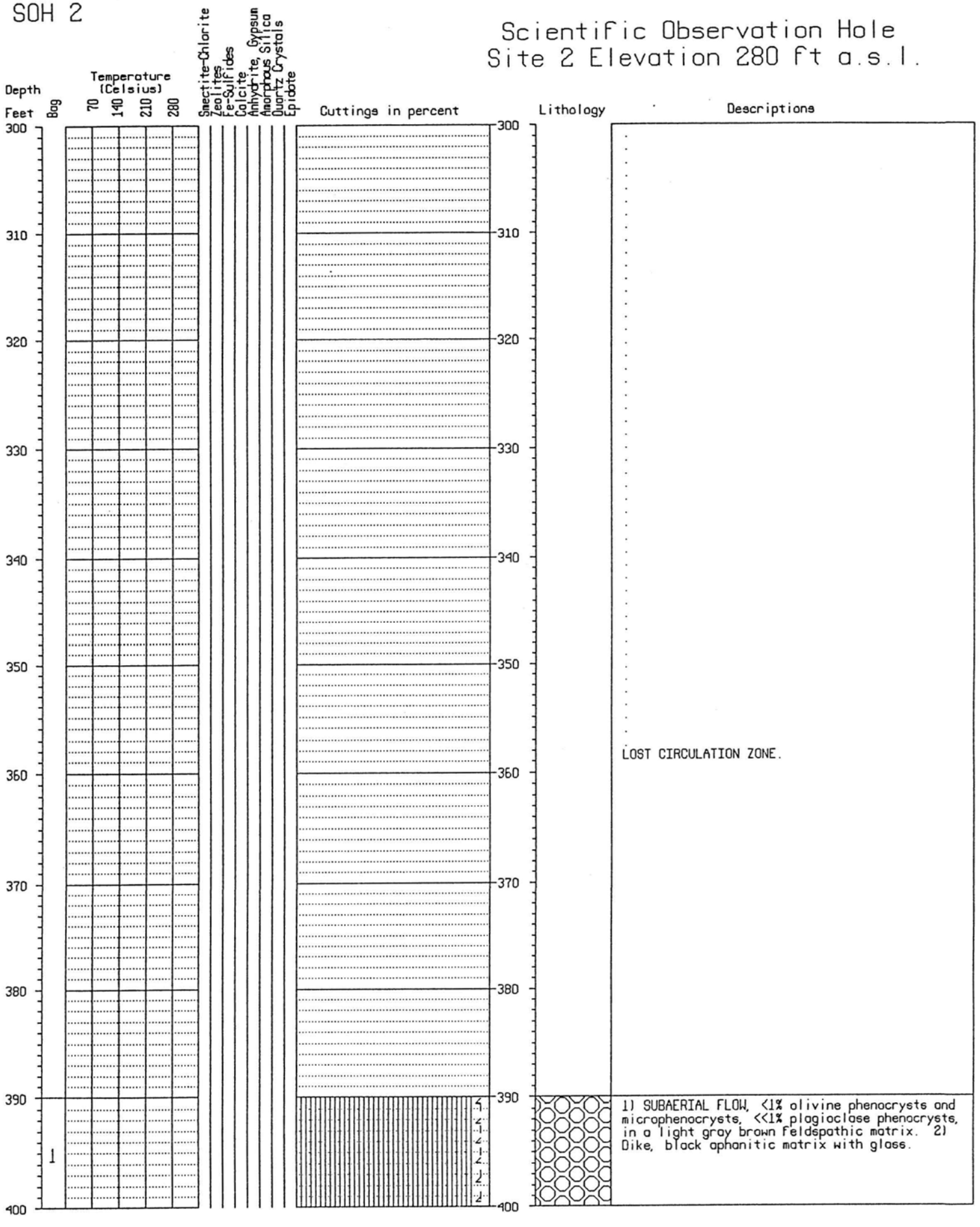
Figure 6. Sample core log.

Scientific Observation Hole Log

Site 2

SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



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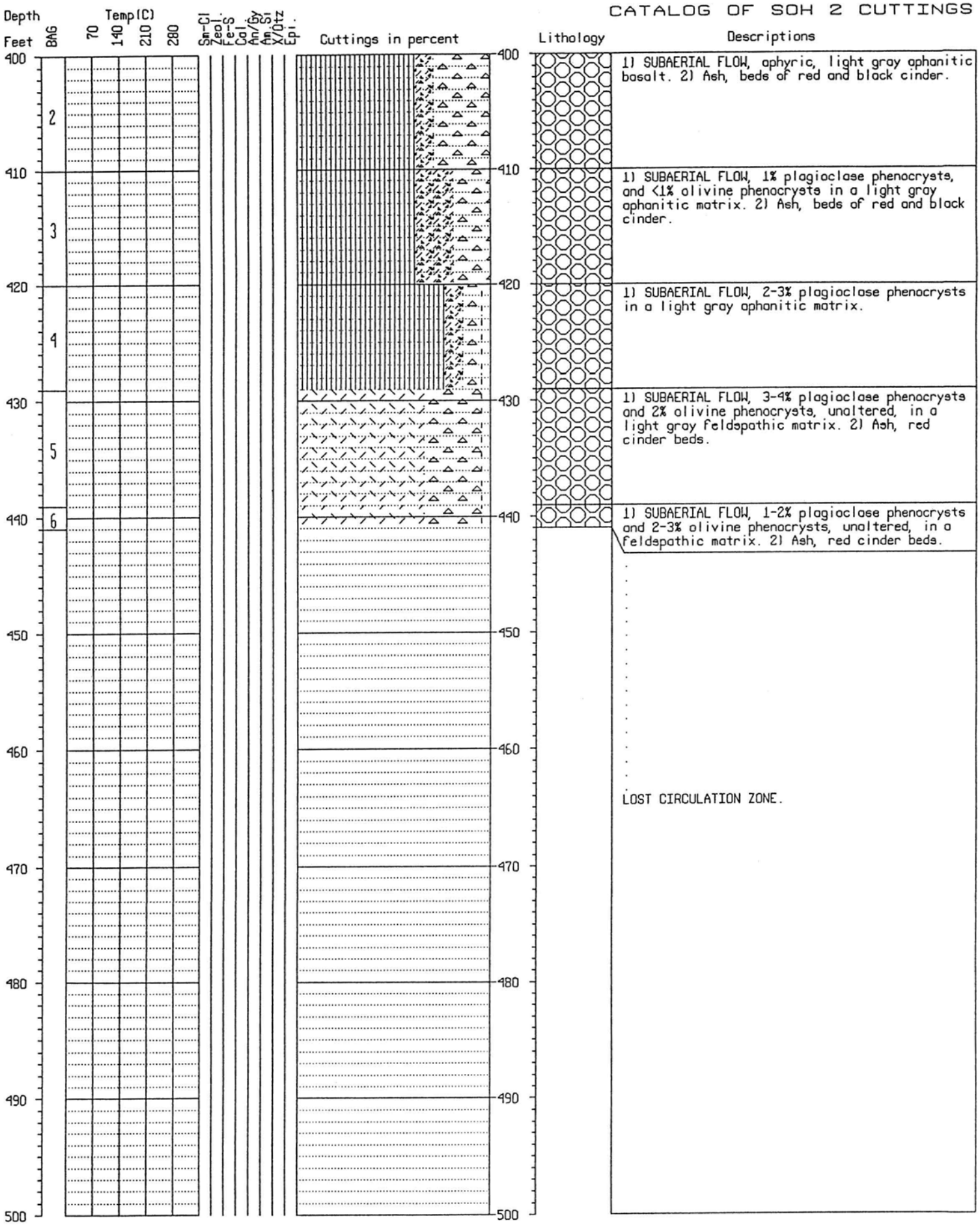
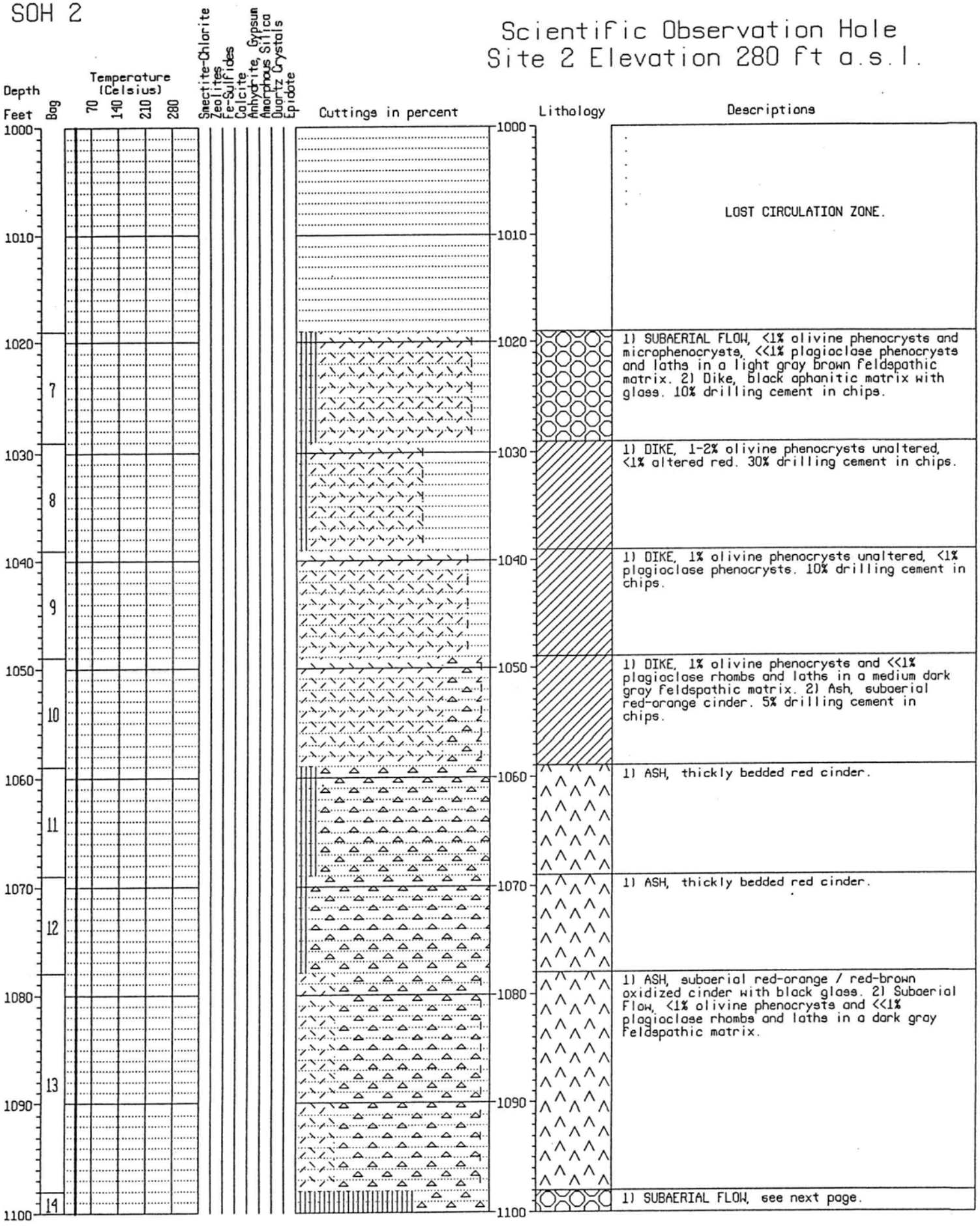


SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



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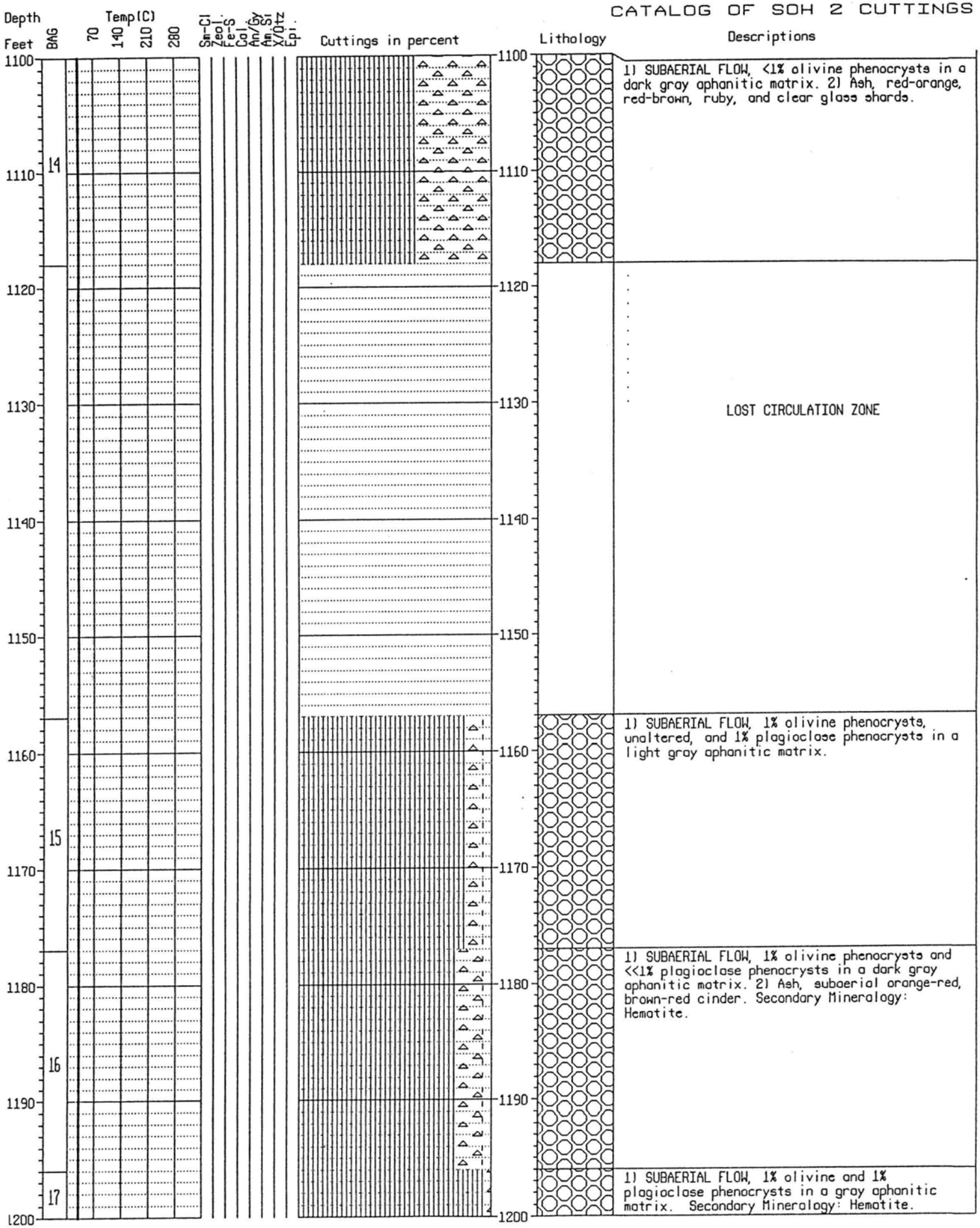

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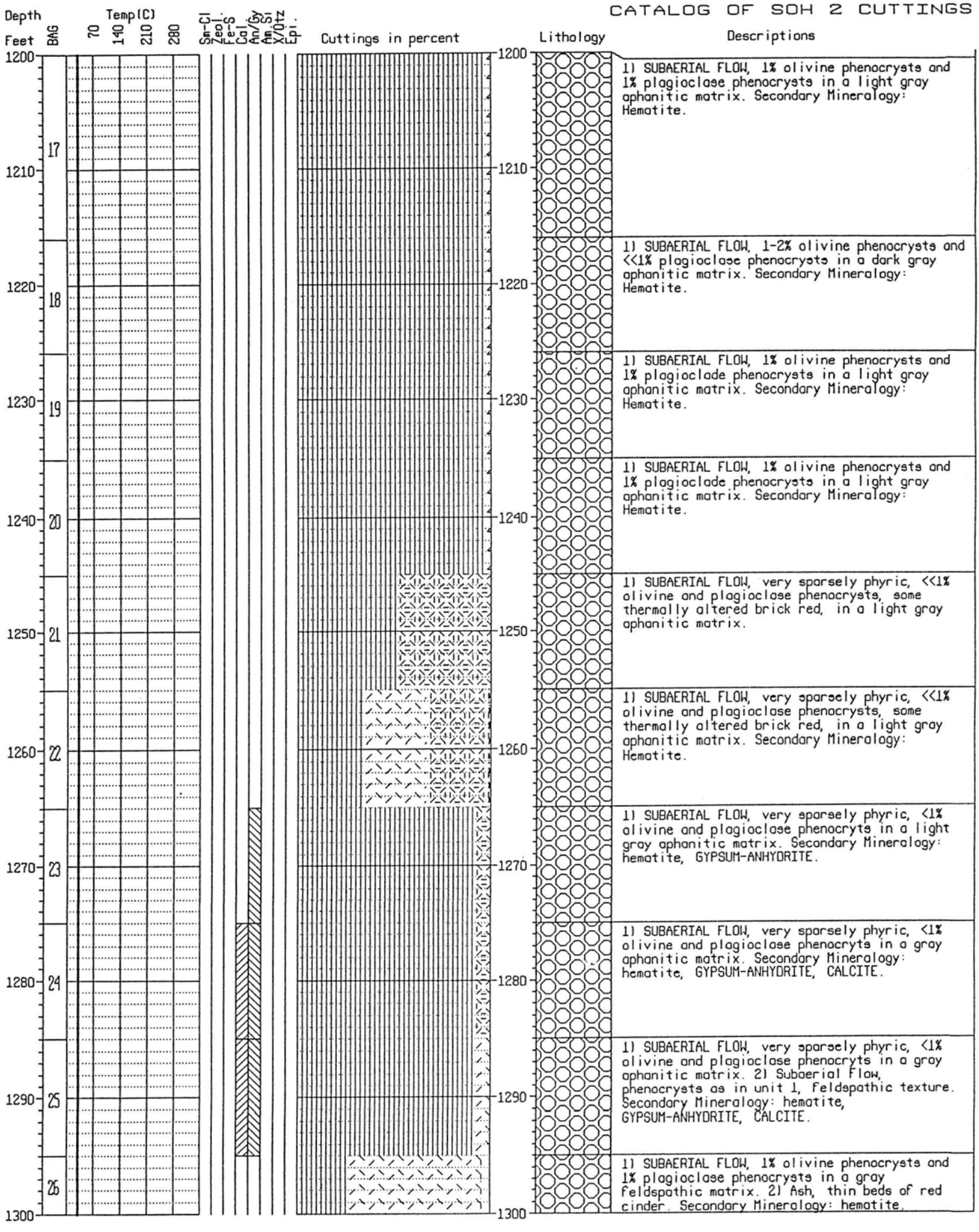

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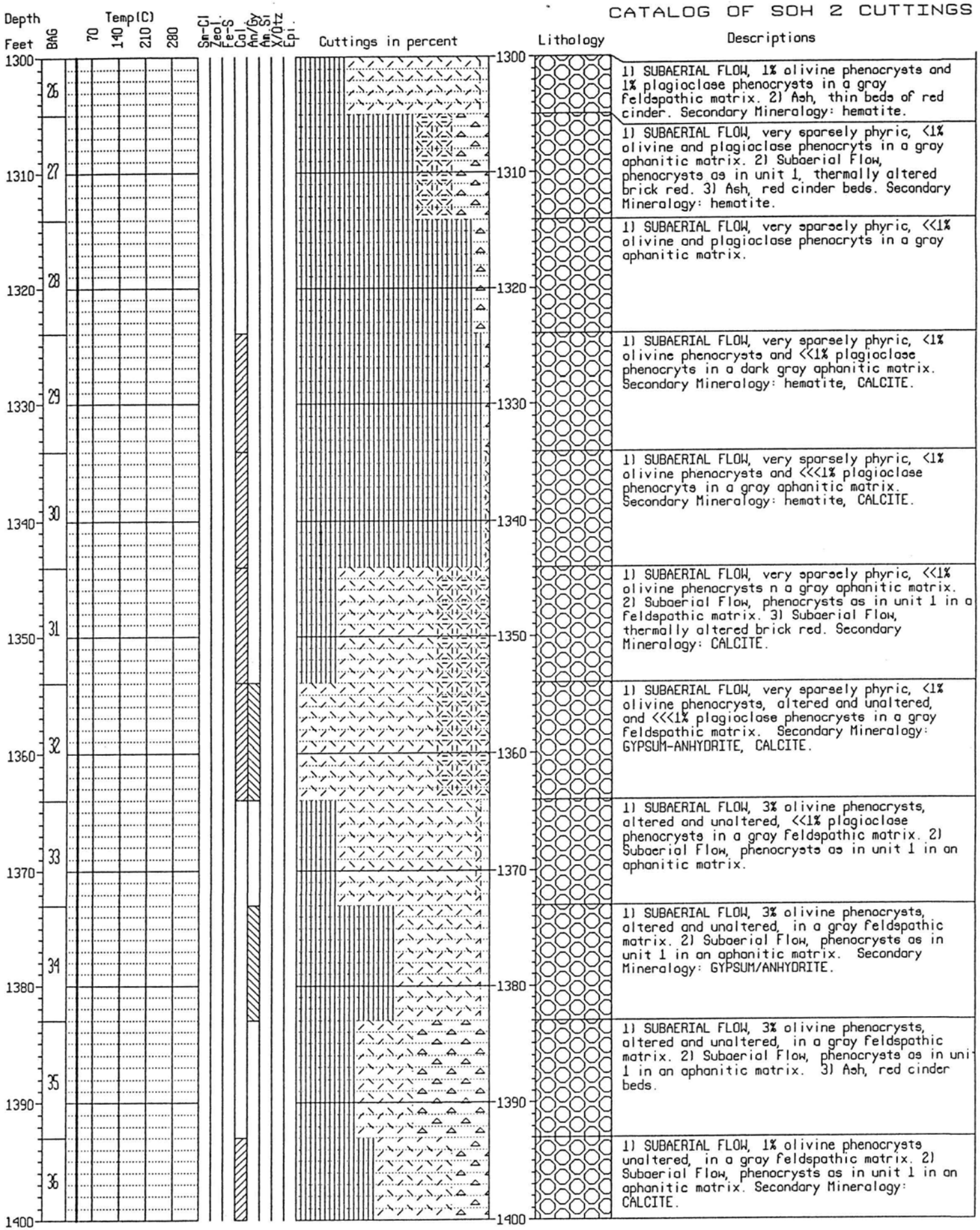

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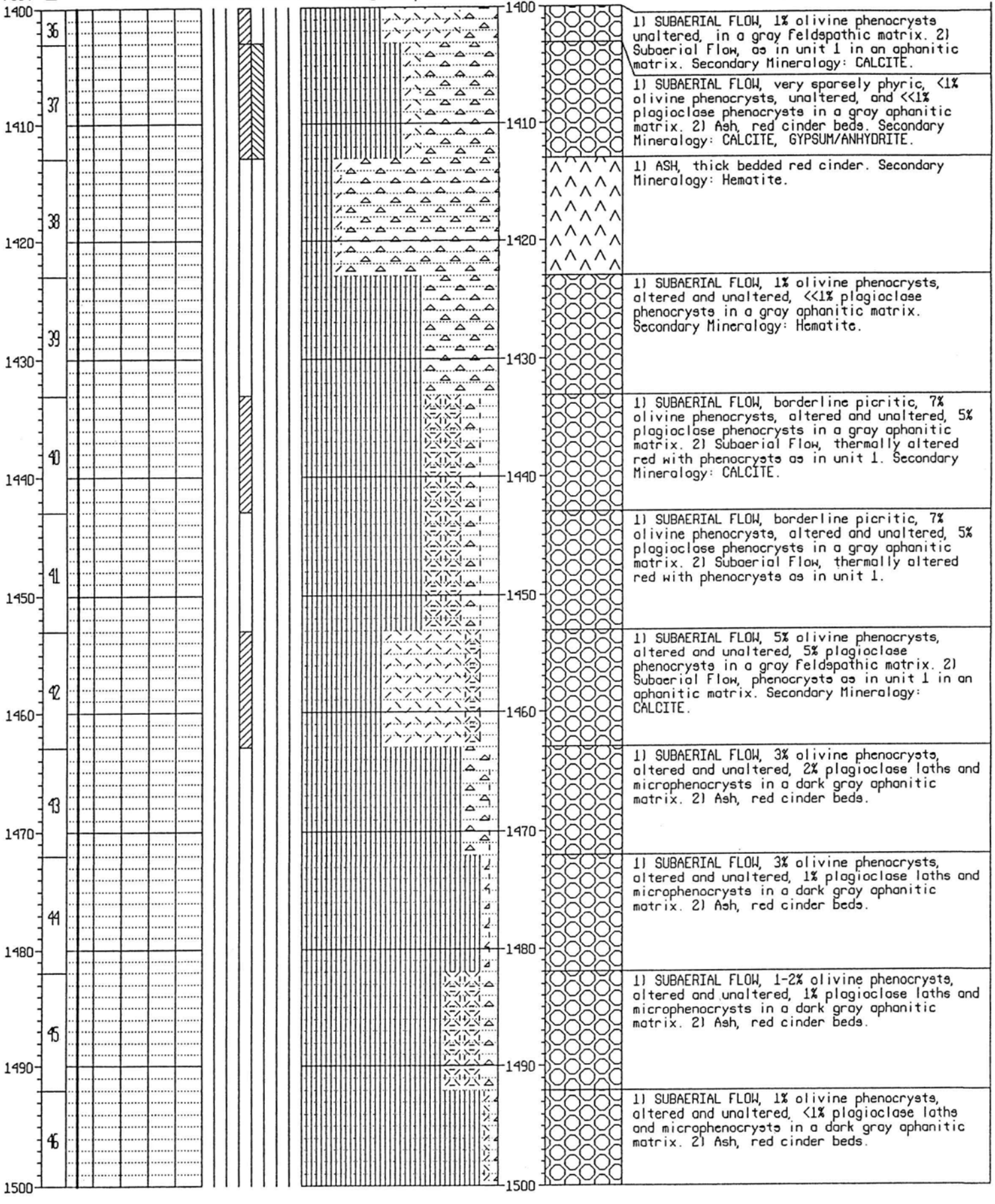

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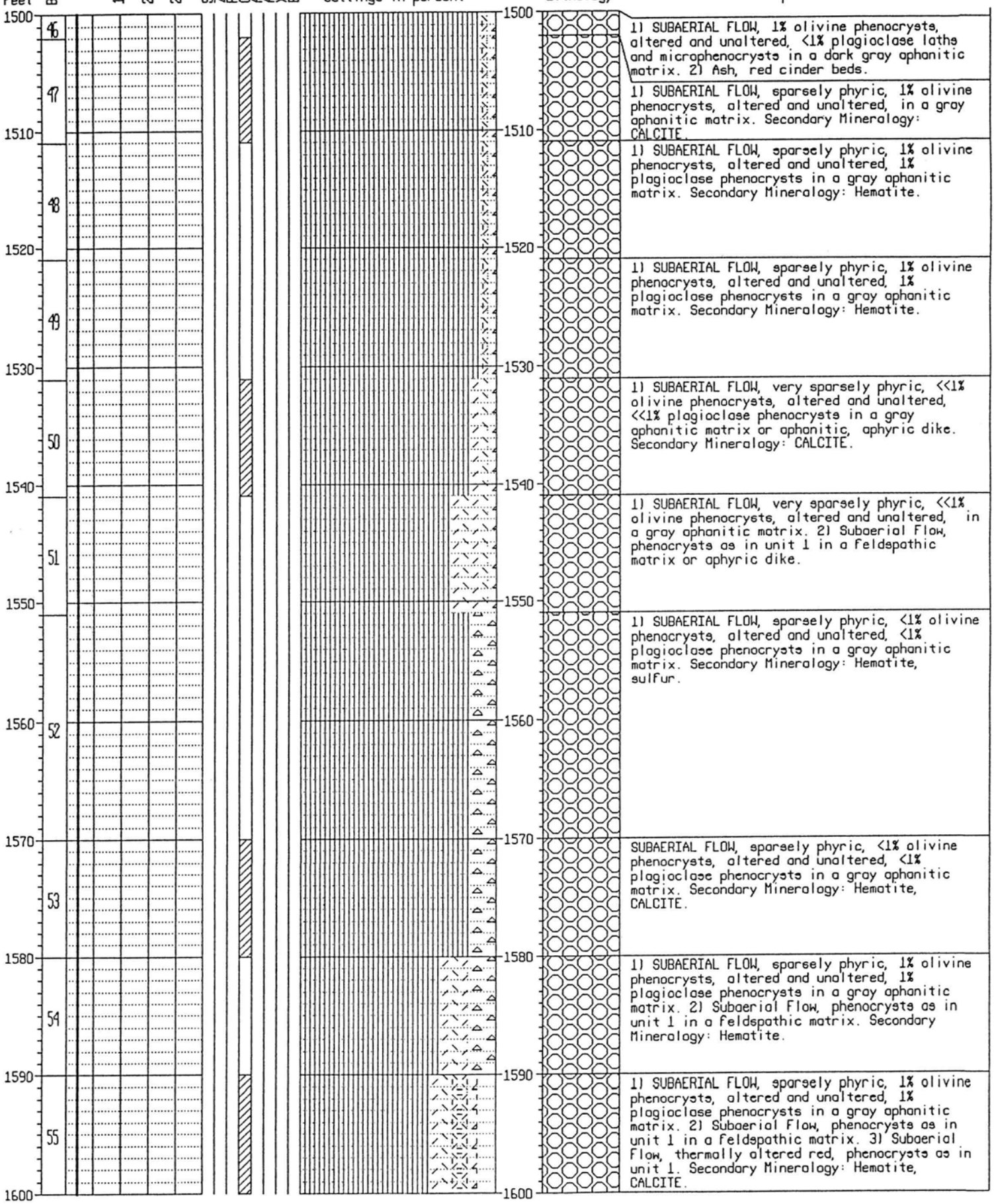
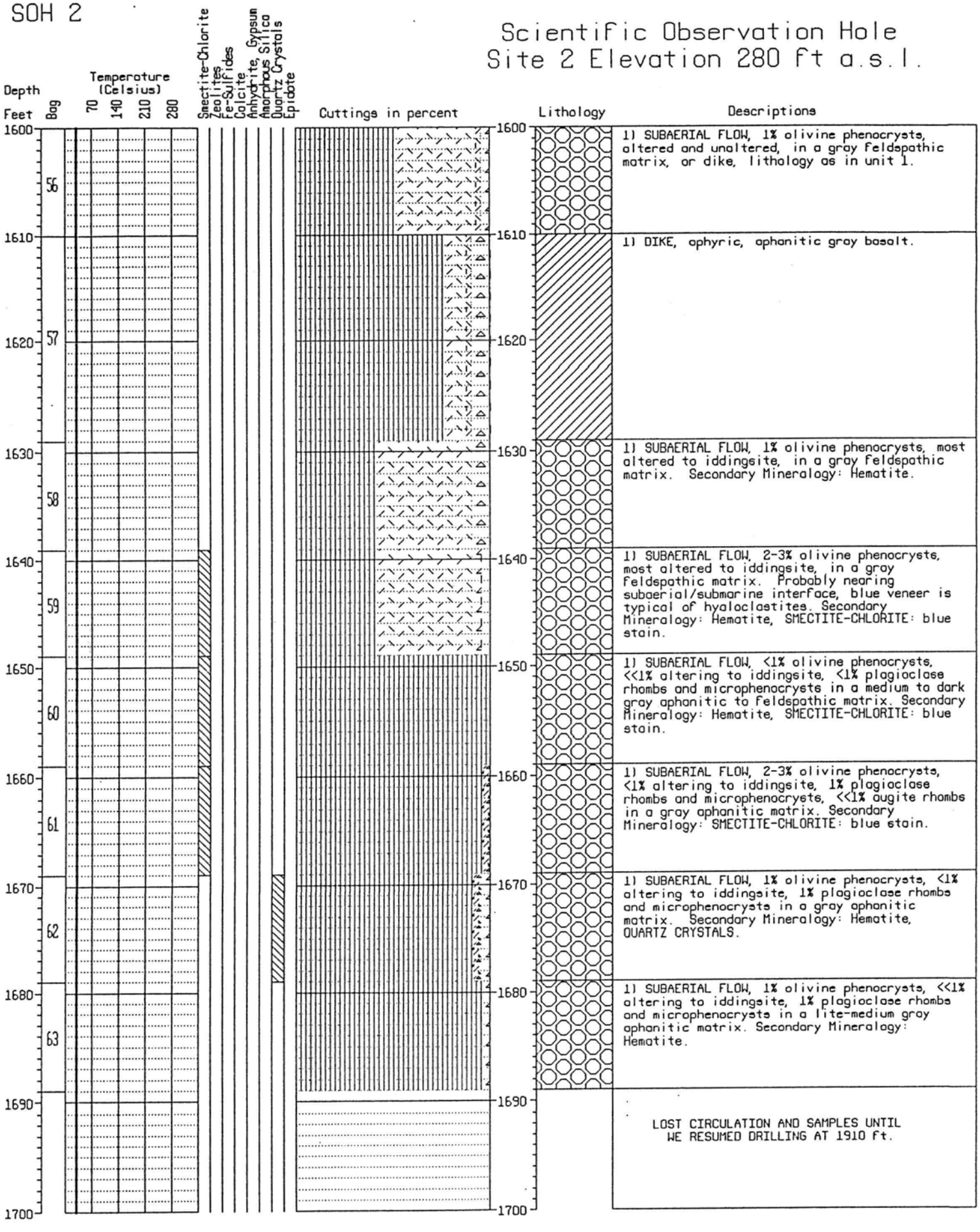
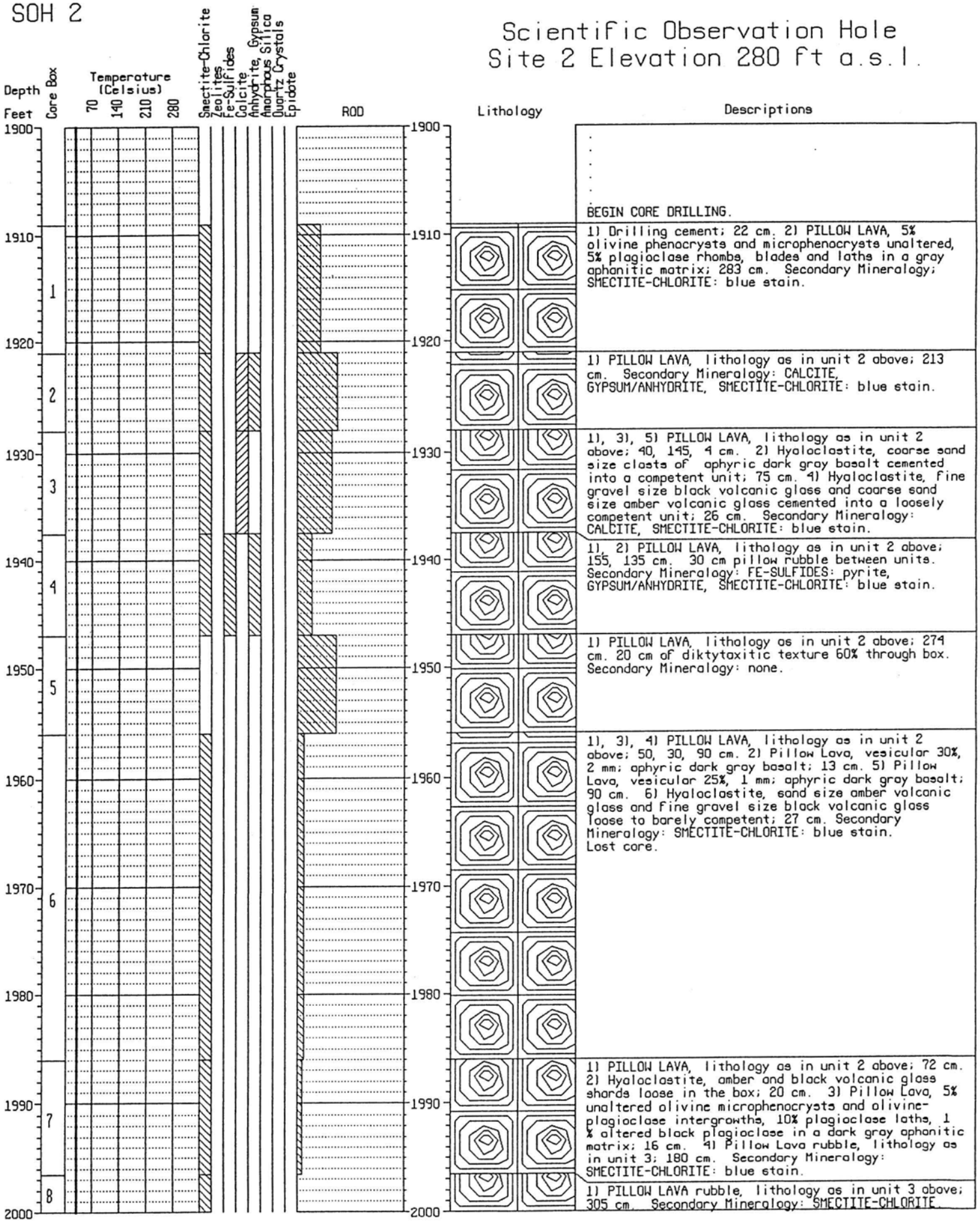


SOH 2

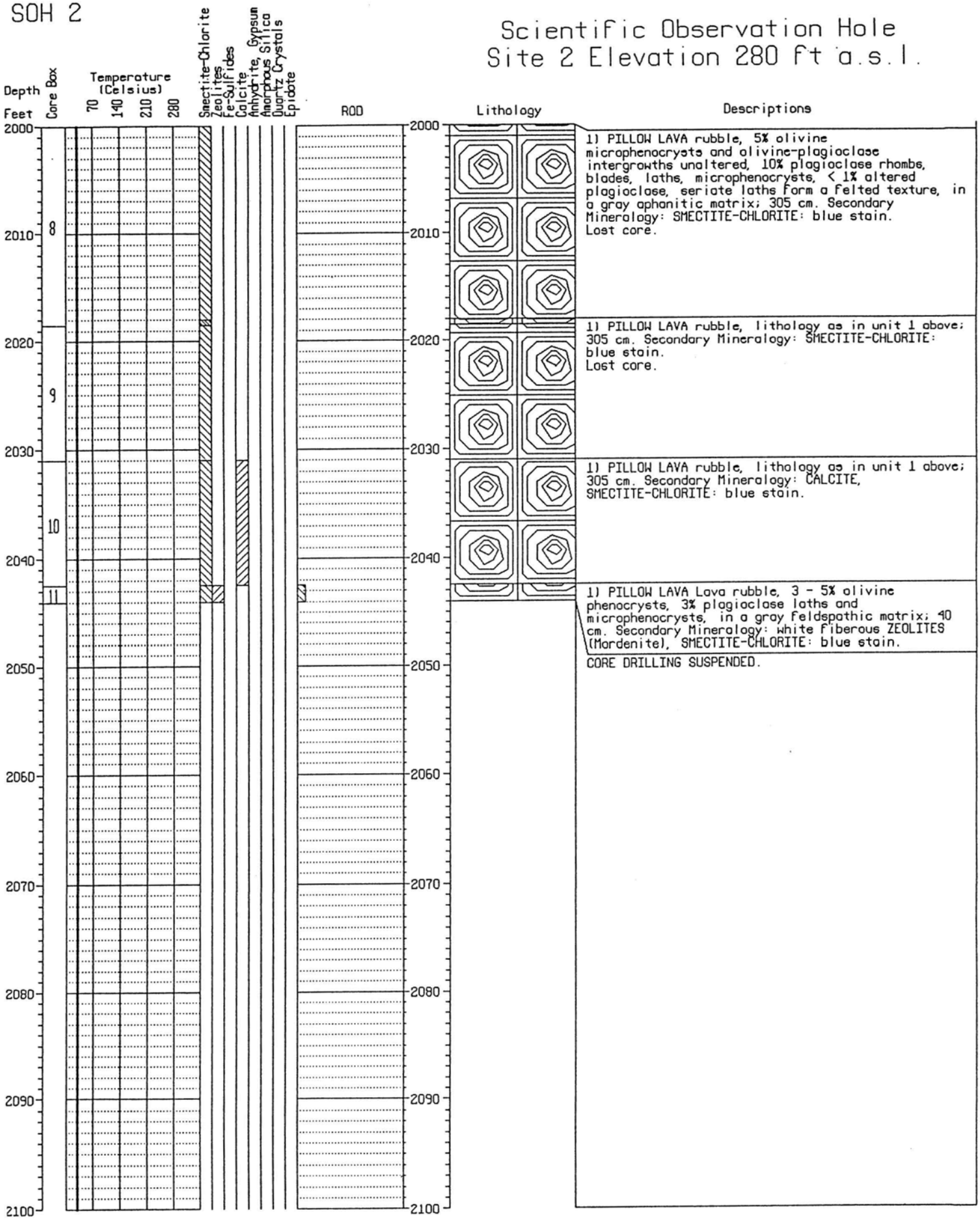
Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



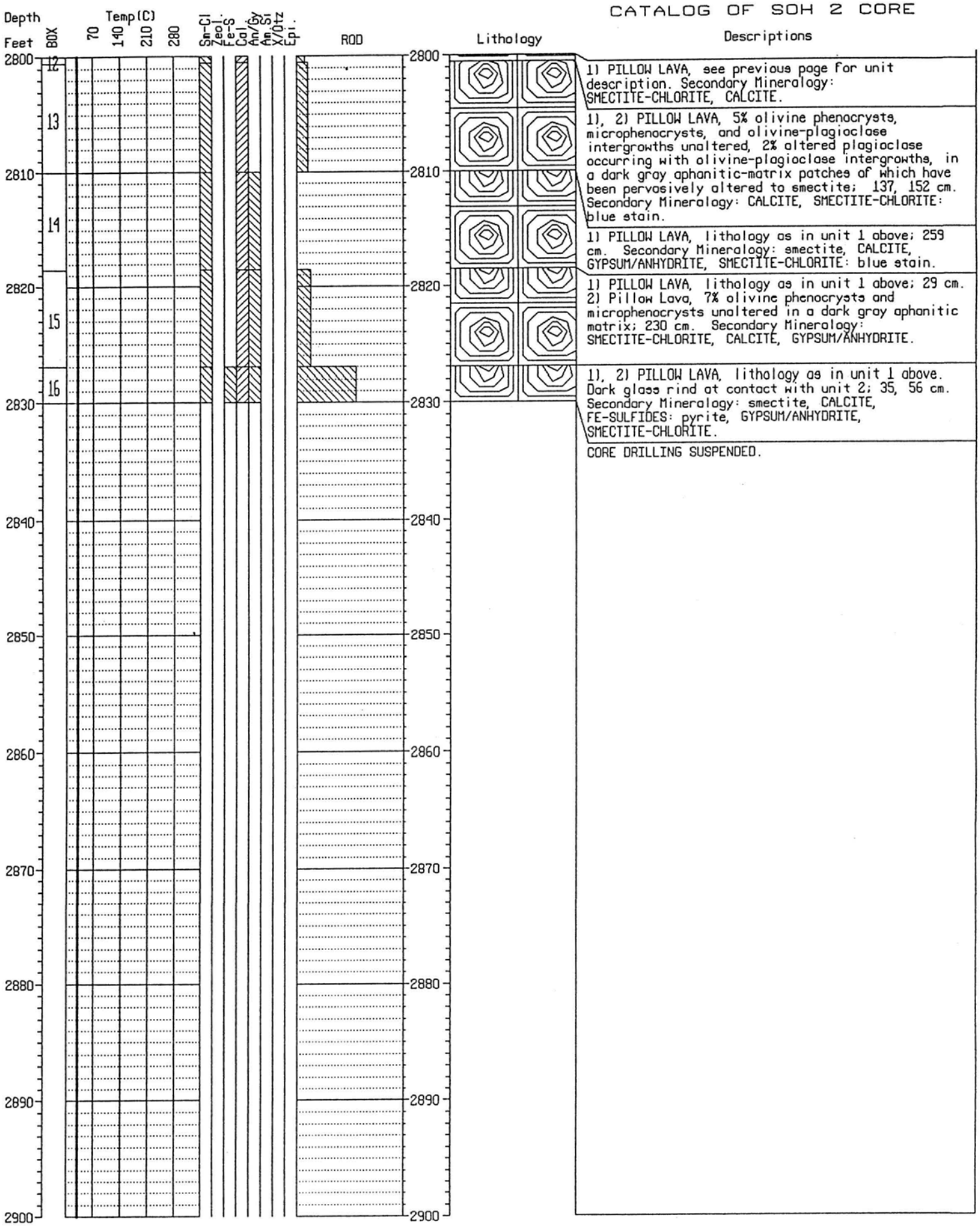

SOH 2
Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.
Depth
Feet
Core Box
Temperature
(Celsius)
70
140
210
280
Smectite-Chlorite
Zeolites
Fe-Sulfides
Calcite
Anhydrite, Gypsum
Amorphous Silica
Quartz Crystals
Epidote
ROD
Lithology
Descriptions
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
1
2
3
4
5
6
7
8
BEGIN CORE DRILLING.
1) Drilling cement; 22 cm. 2) PILLOW LAVA, 5% olivine phenocrysts and microphenocrysts unaltered, 5% plagioclase rhombs, blades and laths in a gray aphanitic matrix; 283 cm. Secondary Mineralogy; SMECTITE-CHLORITE: blue stain.
1) PILLOW LAVA, lithology as in unit 2 above; 213 cm. Secondary Mineralogy: CALCITE, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE: blue stain.
1), 3), 5) PILLOW LAVA, lithology as in unit 2 above; 40, 145, 4 cm. 2) Hyaloclastite, coarse sand size clasts of aphyric dark gray basalt cemented into a competent unit; 75 cm. 4) Hyaloclastite, fine gravel size black volcanic glass and coarse sand size amber volcanic glass cemented into a loosely competent unit; 26 cm. Secondary Mineralogy: CALCITE, SMECTITE-CHLORITE: blue stain.
1), 2) PILLOW LAVA, lithology as in unit 2 above; 155, 135 cm. 30 cm pillow rubble between units. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE: blue stain.
1) PILLOW LAVA, lithology as in unit 2 above; 274 cm. 20 cm of diktytaxitic texture 60% through box. Secondary Mineralogy: none.
1), 3), 4) PILLOW LAVA, lithology as in unit 2 above; 50, 30, 90 cm. 2) Pillow Lava, vesicular 30%, 2 mm; aphyric dark gray basalt; 13 cm. 5) Pillow Lava, vesicular 25%, 1 mm; aphyric dark gray basalt; 90 cm. 6) Hyaloclastite, sand size amber volcanic glass and fine gravel size black volcanic glass loose to barely competent; 27 cm. Secondary Mineralogy: SMECTITE-CHLORITE: blue stain. Lost core.
1) PILLOW LAVA, lithology as in unit 2 above; 72 cm. 2) Hyaloclastite, amber and black volcanic glass shards loose in the box; 20 cm. 3) Pillow Lava, 5% unaltered olivine microphenocrysts and olivine-plagioclase intergrowths, 10% plagioclase laths, 1 % altered black plagioclase in a dark gray aphanitic matrix; 16 cm. 4) Pillow Lava rubble, lithology as in unit 3; 180 cm. Secondary Mineralogy: SMECTITE-CHLORITE: blue stain.
1) PILLOW LAVA rubble, lithology as in unit 3 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.

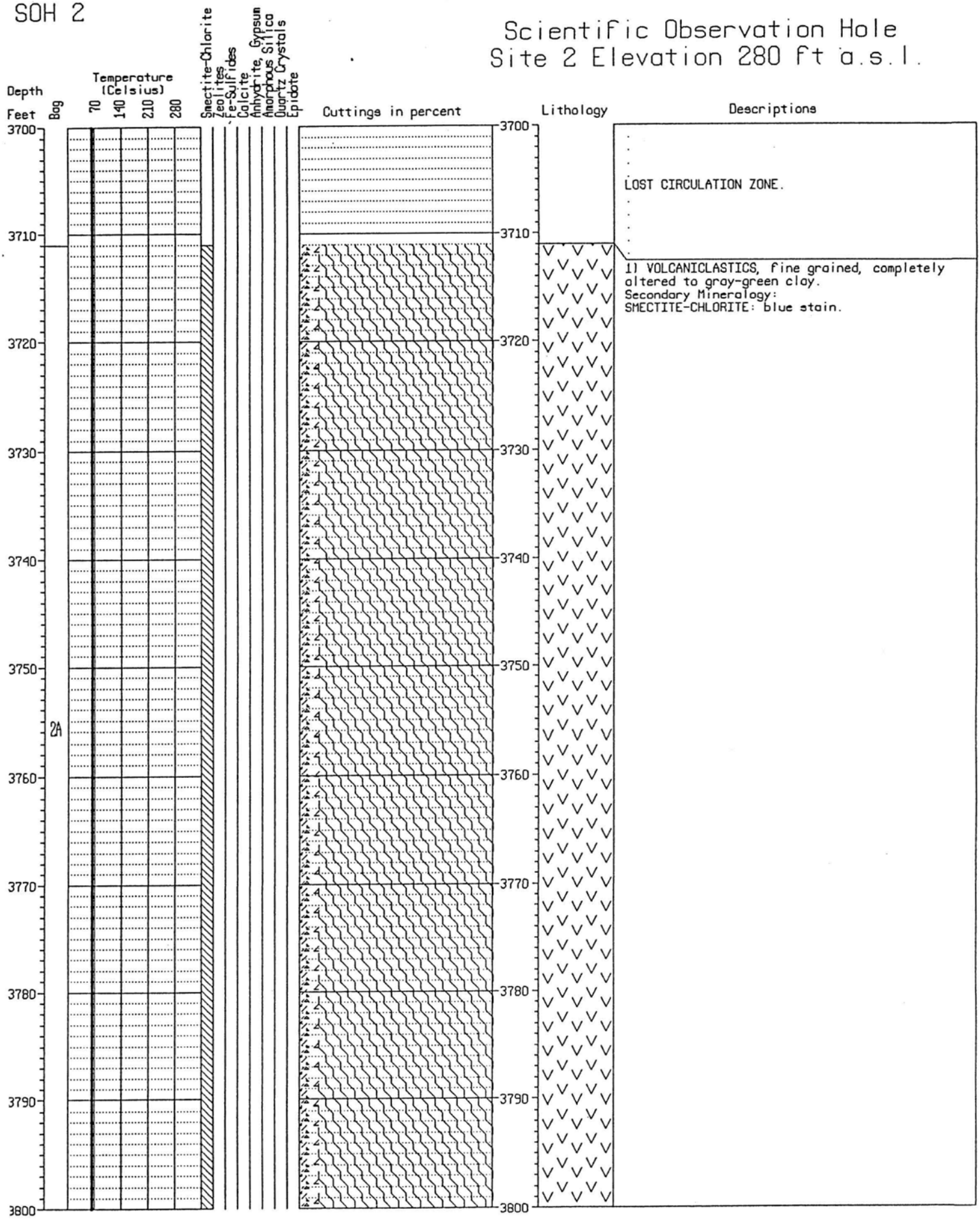


CATALOG OF SOH 2 CORE



SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



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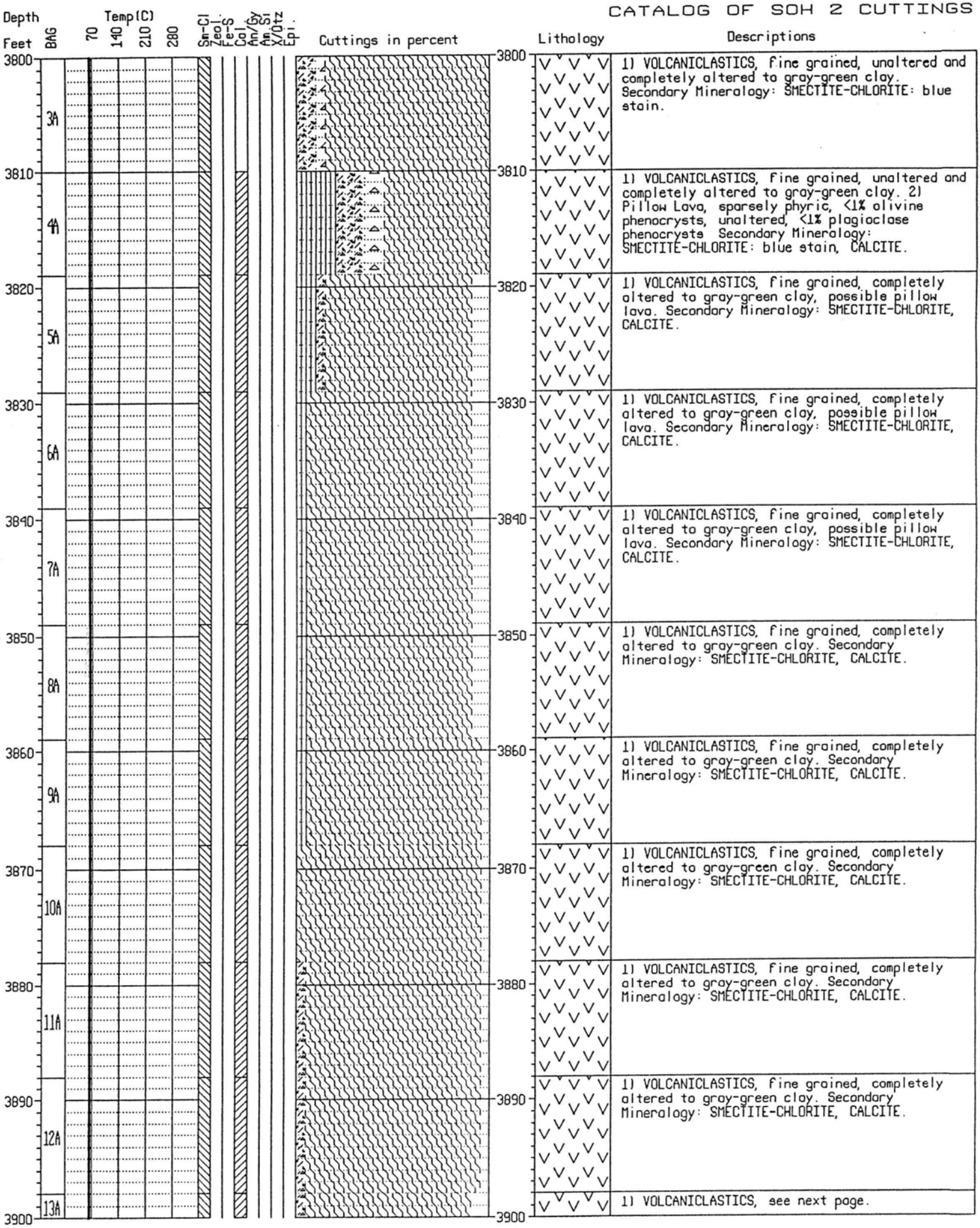

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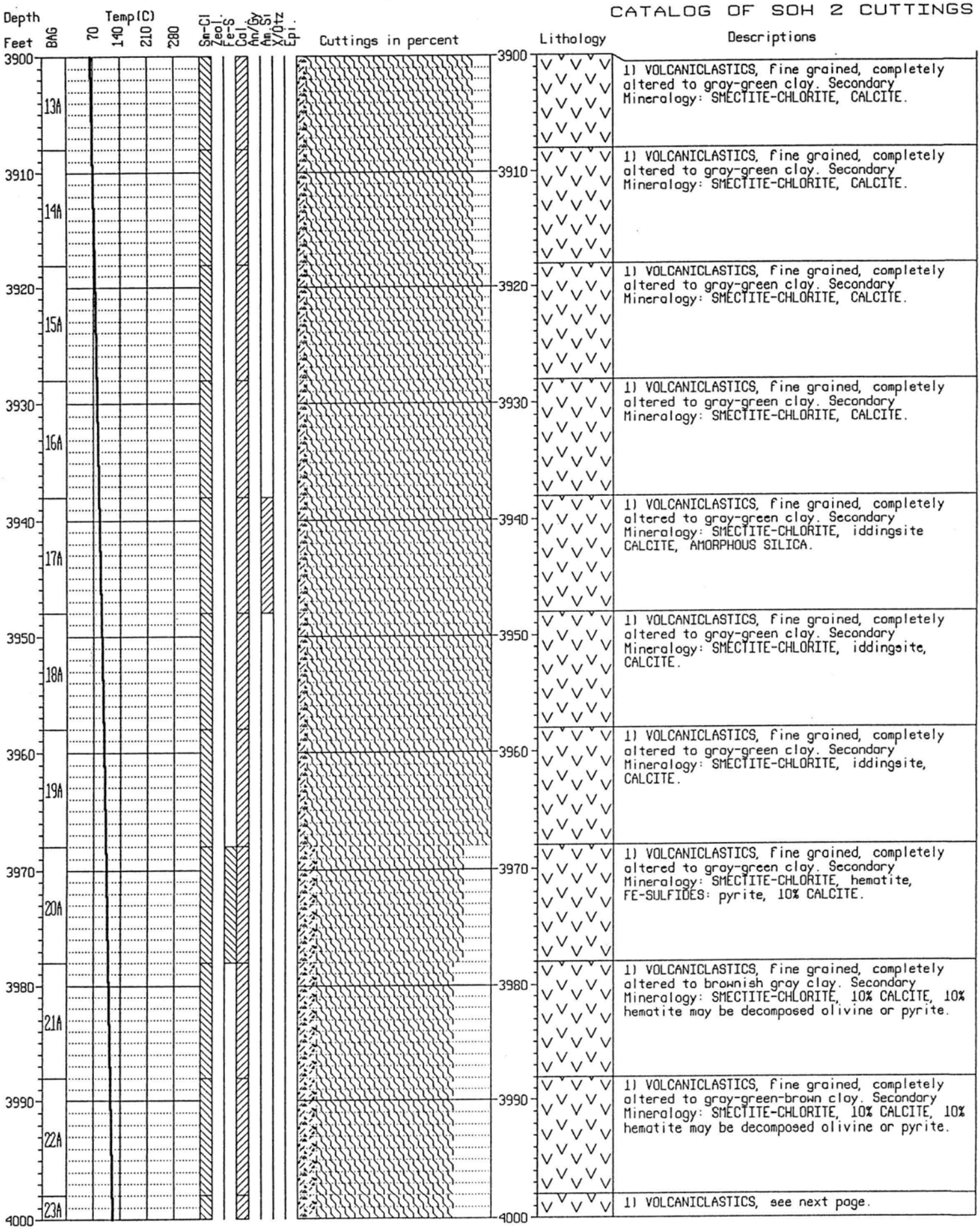
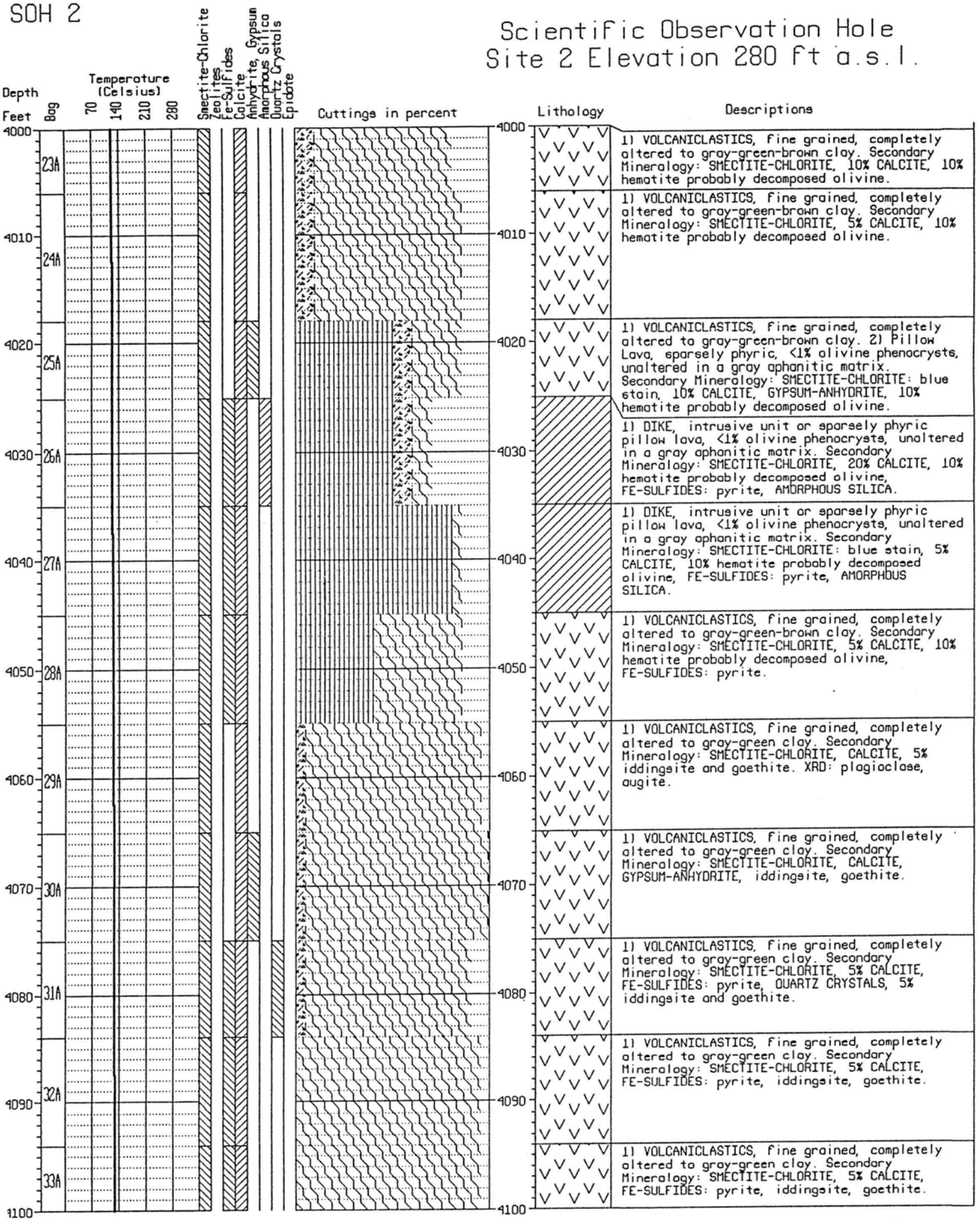


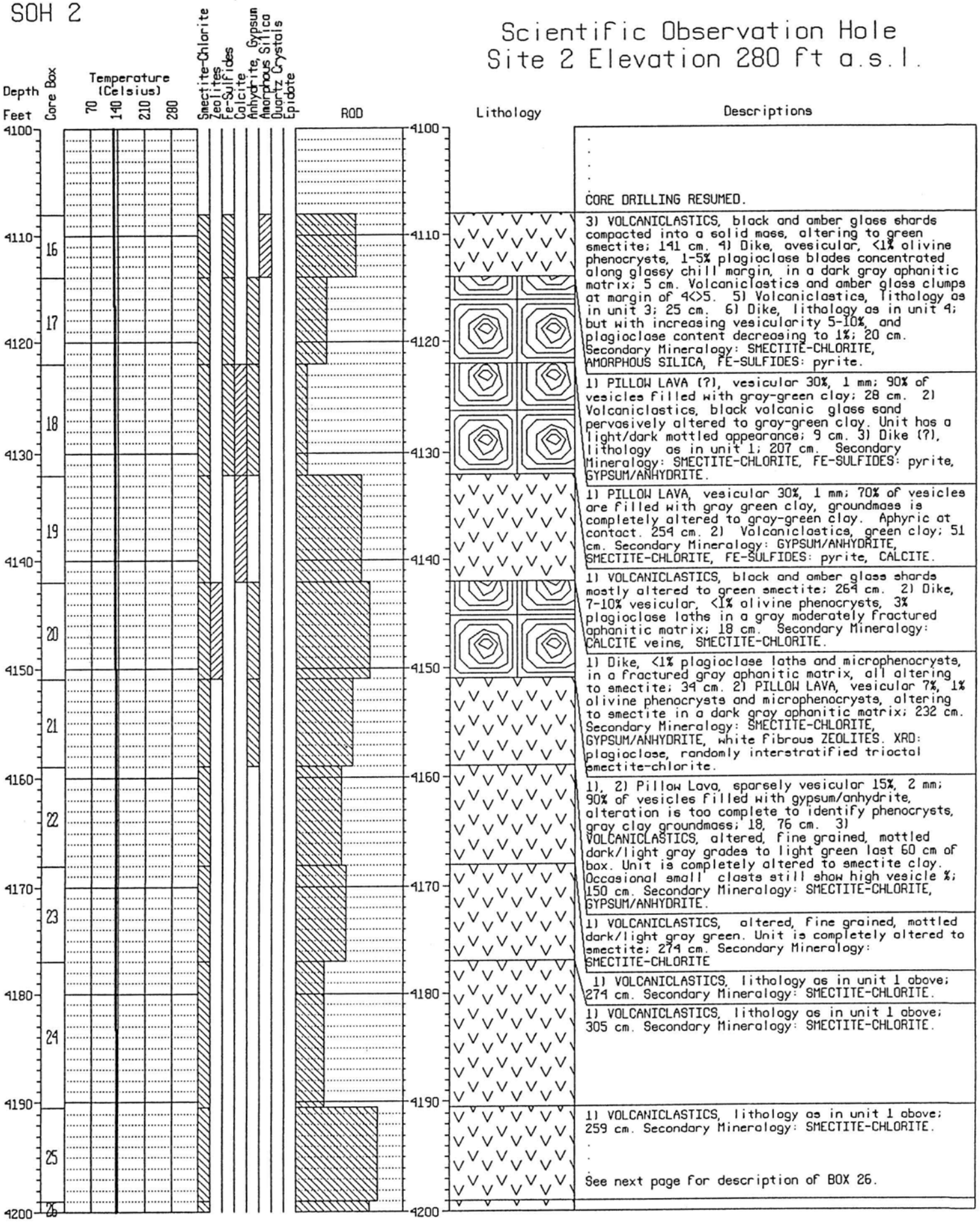
SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



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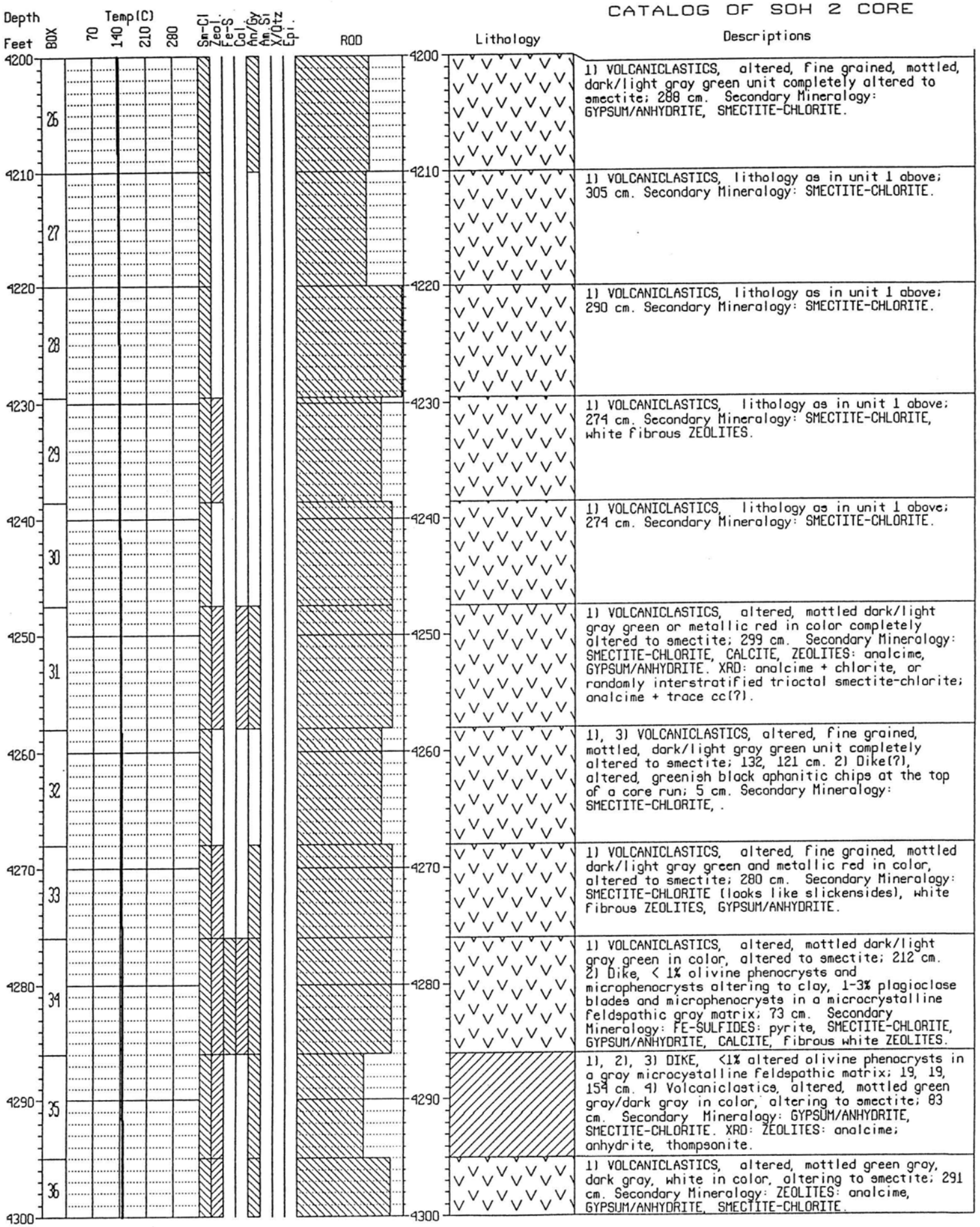

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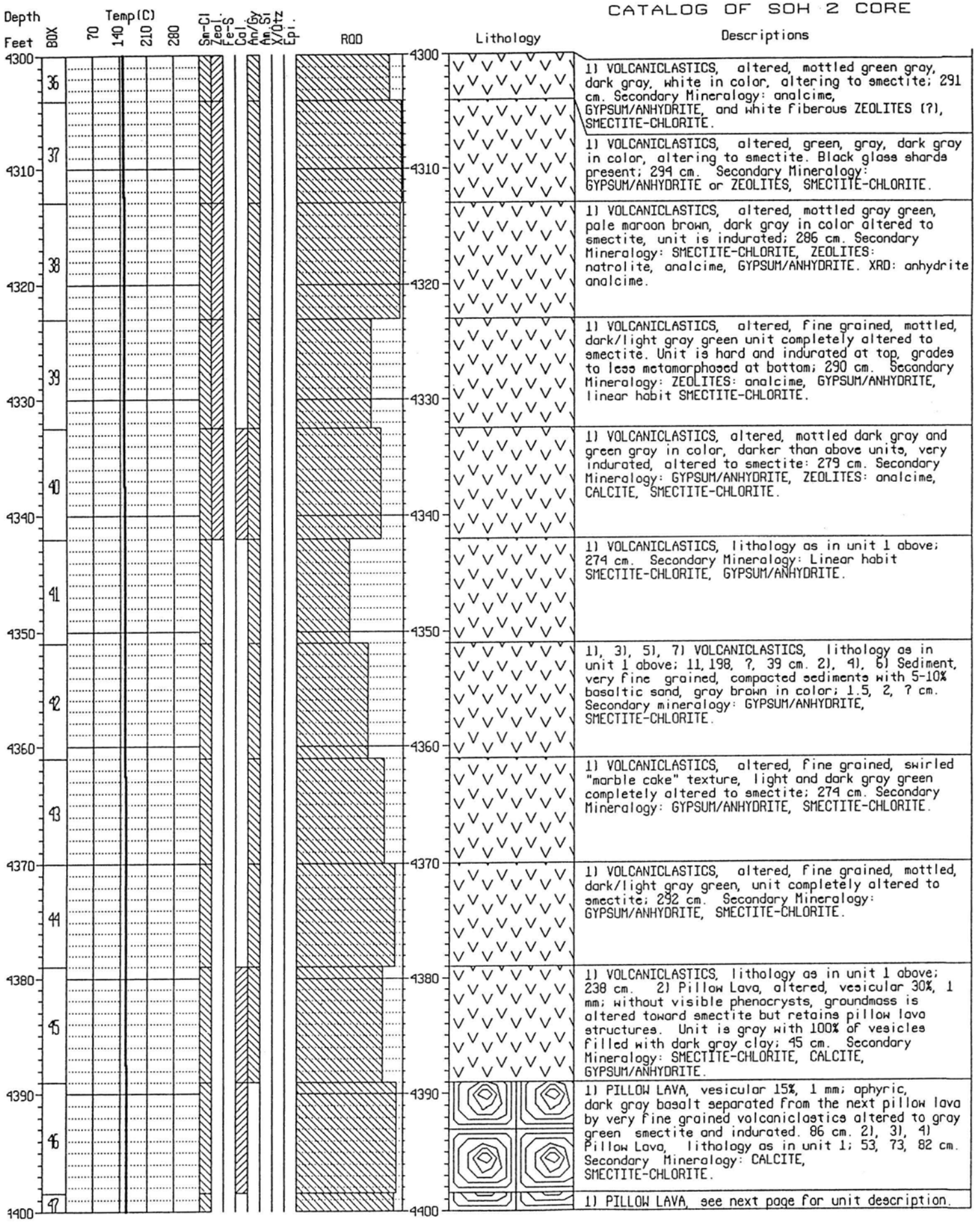
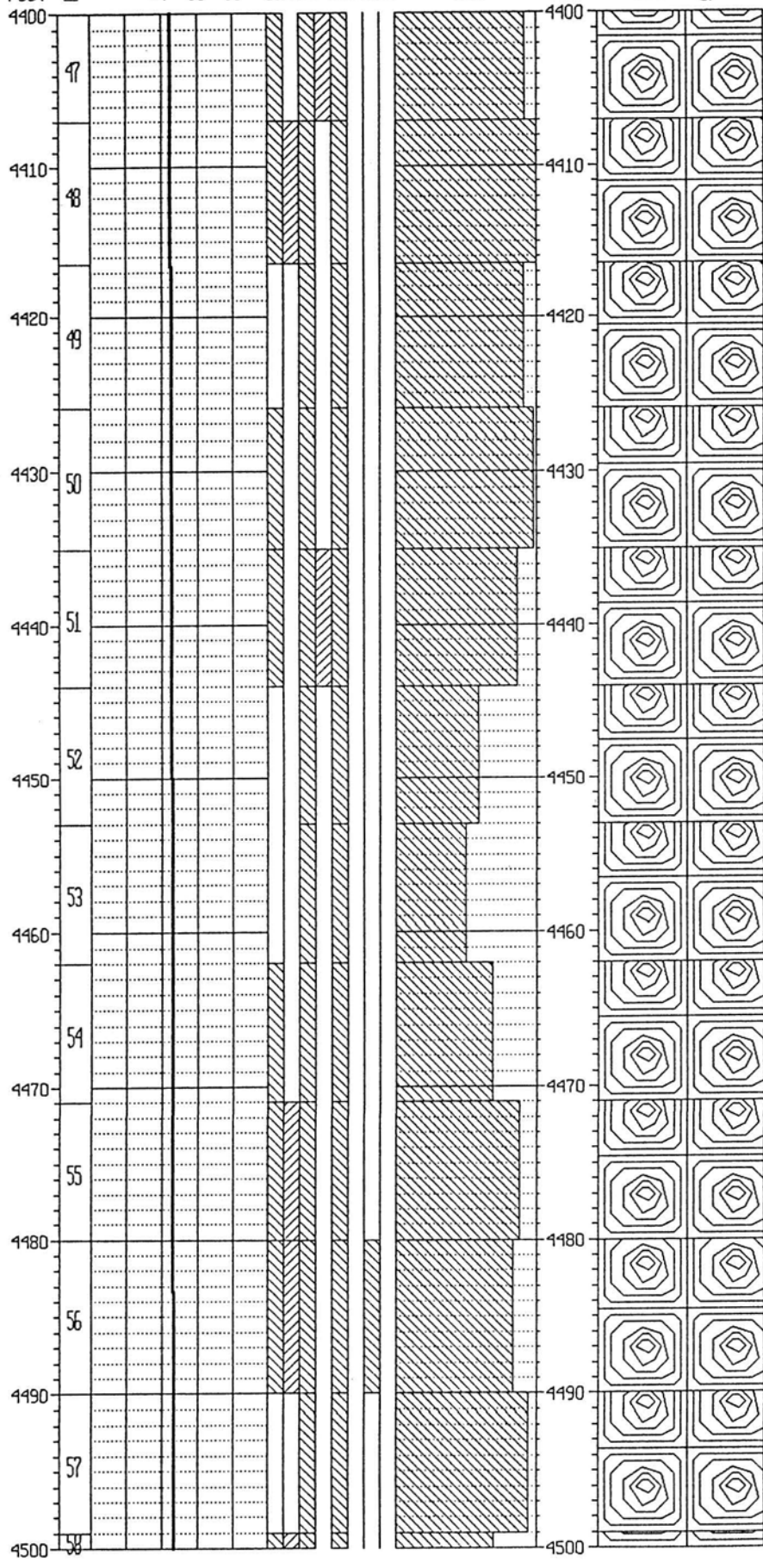


CATALOG OF SOH 2 CORE



Descriptions

1), 2) PILLOW LAVA, vesicular 15%, 1 mm; aphyric, dark gray basalt separated from the next pillow lava by very fine grained volcaniclastics altered to dark gray green smectite and indurated. 33, 196 cm. 3) Pillow Lava, lithology as in unit 1, less alteration shows texture better, vesicle % increases to 30%, texture is microcrystalline, diktytaxitic; 58 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.

1), 2), 3), 4) PILLOW LAVA, vesicular 25%, 1 mm; aphyric dark gray microcrystalline, diktytaxitic basalt separated from the next unit by very fine grained volcaniclastics altered to gray clay and indurated; 199, 25, 28, 43 cm. Secondary Mineralogy: white fibrous ZEOLITES, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.

1), 3), 4), 5), 6) PILLOW LAVA, lithology as in unit 1 above; 18, 62, 62, 117, 32 cm. 2) Massive anhydrite, hydrated on existing fracture, contains angular pillow lava clasts; 25 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1), 2), 3), 4), 5) PILLOW LAVA, lithology as in unit 1 above, separated from the next pillow lava by fine grained volcaniclastite altered to gray clay and indurated; 91, 94 97, 46, 27 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.

1), 2), 3), 4), 5), 6) PILLOW LAVA, lithology as in unit 1 above; 27, 57, 19, 21, 68, 55 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.

1), 3), 5) PILLOW LAVA, vesicular 25%, 1 mm; gray diktytaxitic, feldspathic basalt, 2-4 cm volcaniclastics at contacts; 226, 19, 31 cm. 2), 4) Dike, sparsely vesicular 10%, 3 mm; gray aphyric, aphanitic basalt. Intrudes at pillow lava contacts; 2, 10 cm. 2<>3 = 60, 3<>4 = 55, 4<>5 = 0 degrees. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1), 2), 3), 5), 8) PILLOW LAVA, lithology as in unit 1 above; 60, 30, 17, 17, 152 cm. 4), 6), 7) Dike, sparsely vesicular, 10%, 2 mm; gray aphyric, aphanitic basalt. Intrudes at pillow lava contacts; 10, 6, 30 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

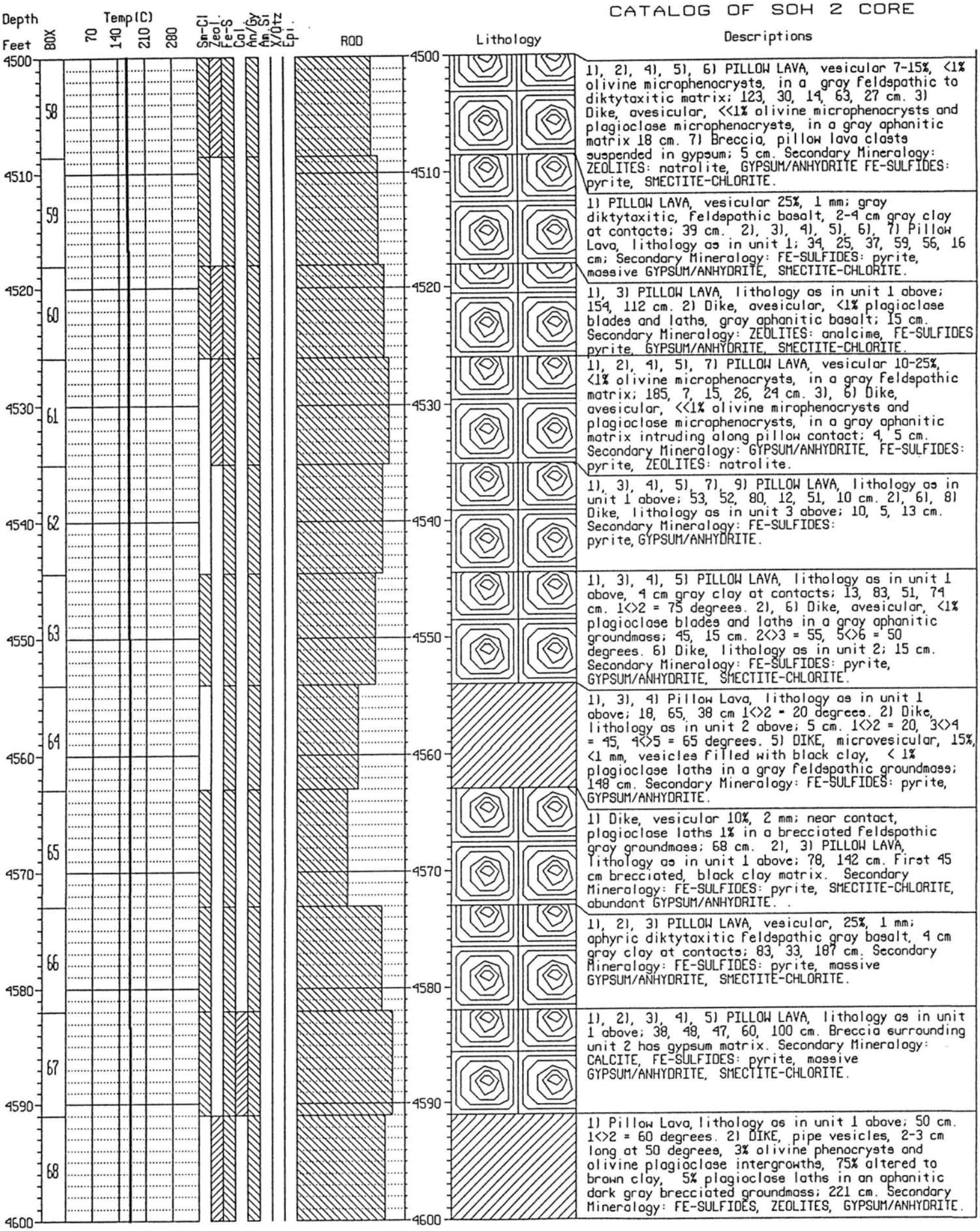
1) PILLOW LAVA, vesicular 30%, 1 mm; diktytaxitic, feldspathic basalt. Groundmass alteration increases through last 70 cm of box to complete smectite; 300 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE, SMECTITE-CHLORITE.

1) PILLOW LAVA, vesicular 5-25%, <1% olivine phenocrysts in a highly altered green groundmass; 269 cm. 2) Pillow Lava, vesicular 30%, aphyric, gray feldspathic matrix; 10 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, SMECTITE-CHLORITE, ZEOLITES, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1), 3), 5) PILLOW LAVA, vesicular 20-30%, < 1% olivine phenocrystsin a gray feldspathic matrix; 17, 106, 147 cm. 2), 4) Dike, <1% olivine phenocrysts and olivne-plagioclase intergrowths, < 1% and plagiolcase laths, in a gray aphanitic matrix; 4, 17 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE. XRD: mordenite.

1), 2), 3) PILLOW LAVA, vesicular 30%, 1 mm; vesicles filled with black clay, diktytaxitic, feldspathic basalt, gray clay at contacts; 156, 57, 74 cm. 2<>3 has gypsum matrix. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE. See next page for description of BOX 58.

CATALOG OF SOH 2 CORE



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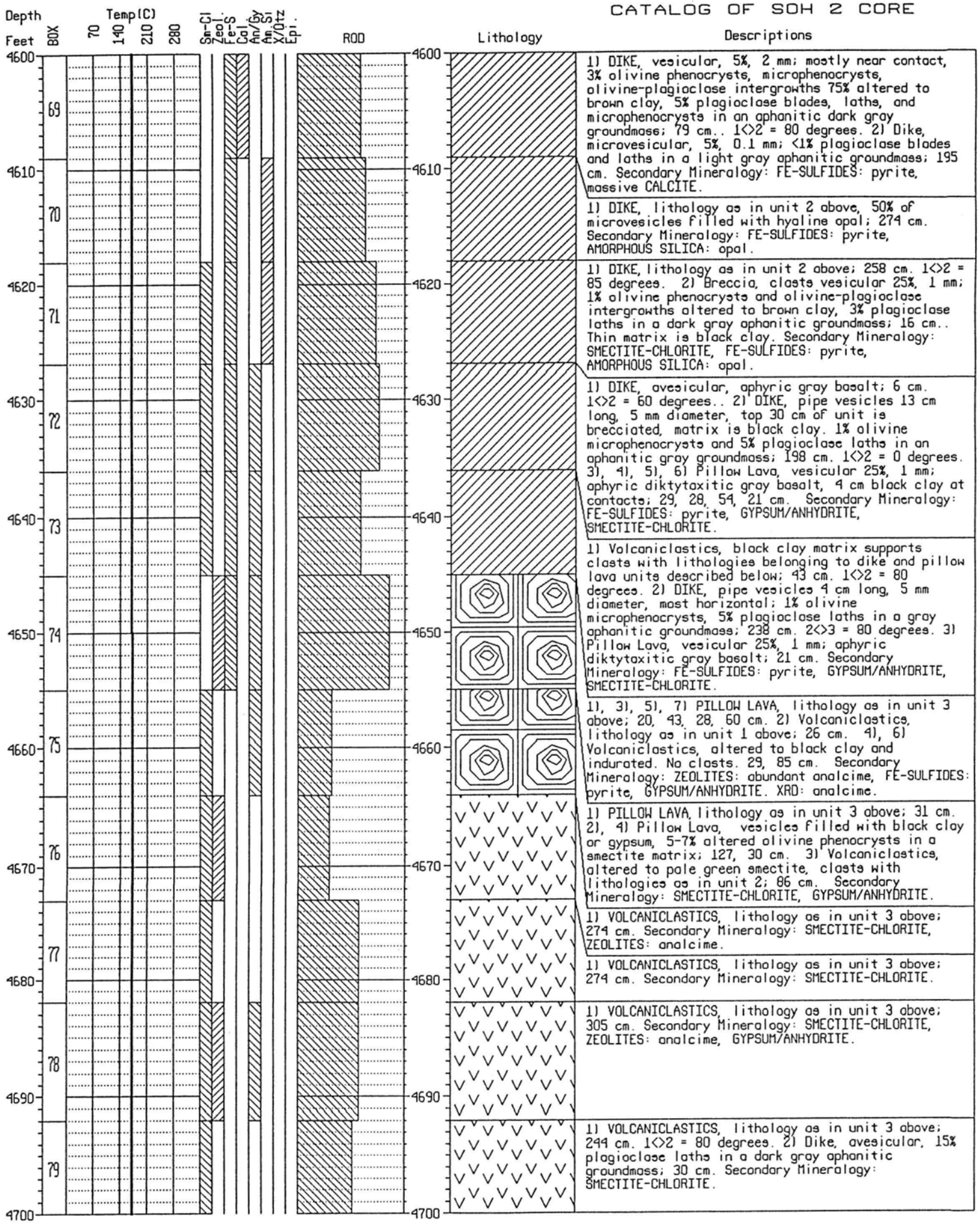

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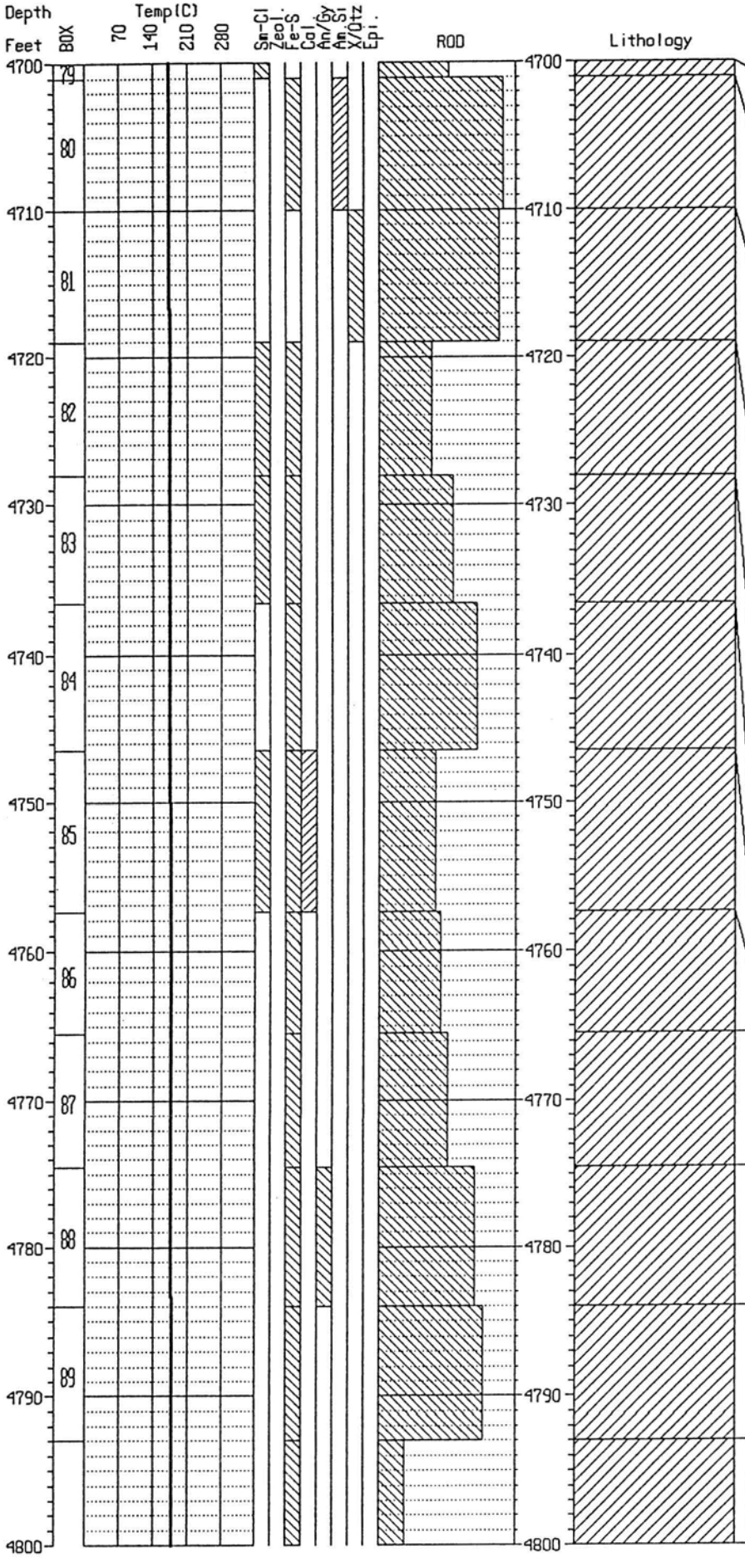


Descriptions

2) DIKE, see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, white vesicle filling.

1) DIKE, avesicular, 15% plagioclase blades, laths, rhombs and microphenocrysts increases to 25% downward through box; <1% olivine microphenocrysts altered black; rare pyrite phenocrysts (?) may be altered olivine; all in an increasingly diktytaxitic light gray matrix. 274 cm. Secondary Mineralogy: AMORPHOUS SILICA, FE-SULFIDES: pyrite.

1), 3) DIKE, sparsely vesicular, 5%, 2 mm; 25% plagioclase laths, blades, rhombs and microphenocrysts, <1% olivine microphenocrysts altered black in diktytaxitic light gray matrix; 213, 21 cm. 2) Dike, avesicular, 1% plagioclase blades and laths in a gray aphanitic matrix. Top contact is distinct, bottom barely discernible. Unit becomes more diktytaxitic toward bottom; 99 cm. 1<>2 = 60, 2<>3 = 55 degrees. Secondary Mineralogy: QUARTZ CRYSTALS.

1) DIKE, sparsely vesicular 5%, 2 mm; plagioclase % drops through box but unit becomes gross grained, holocrystalline, segregated into plagioclase, olivine (unaltered), and augite. Vesicles are filled with black clay. Bottom dip lost in rubble at contact; 164 cm. 2) Dike, microvesicular 15%, <1 mm; 7% plagioclase blades, laths, rhombs and microphenocrysts in a dark gray aphanitic matrix somewhat altered to smectite; 110 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.

1) DIKE, microvesicular 5%, <1 mm; 1% plagioclase blades and laths in a dark gray aphanitic matrix altered to smectite; 97 cm. 1<>2 = 55 degrees. 2) Dike, microvesicular 5%, <1 mm; 25% plagioclase blades, laths, rhombs, and microphenocrysts in a gray matrix which is aphanitic at top contact but becomes pronouncedly diktytaxitic through the box; 162 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.

1) DIKE, sparsely vesicular 5%, 2 mm; 25% plagioclase blades, laths, rhombs, and microphenocrysts in a light gray diktytaxitic matrix; 305 cm. Secondary Mineralogy: common FE-SULFIDES: pyrite.

1) DIKE, lithology as in unit 1 above; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite.

1) DIKE, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.

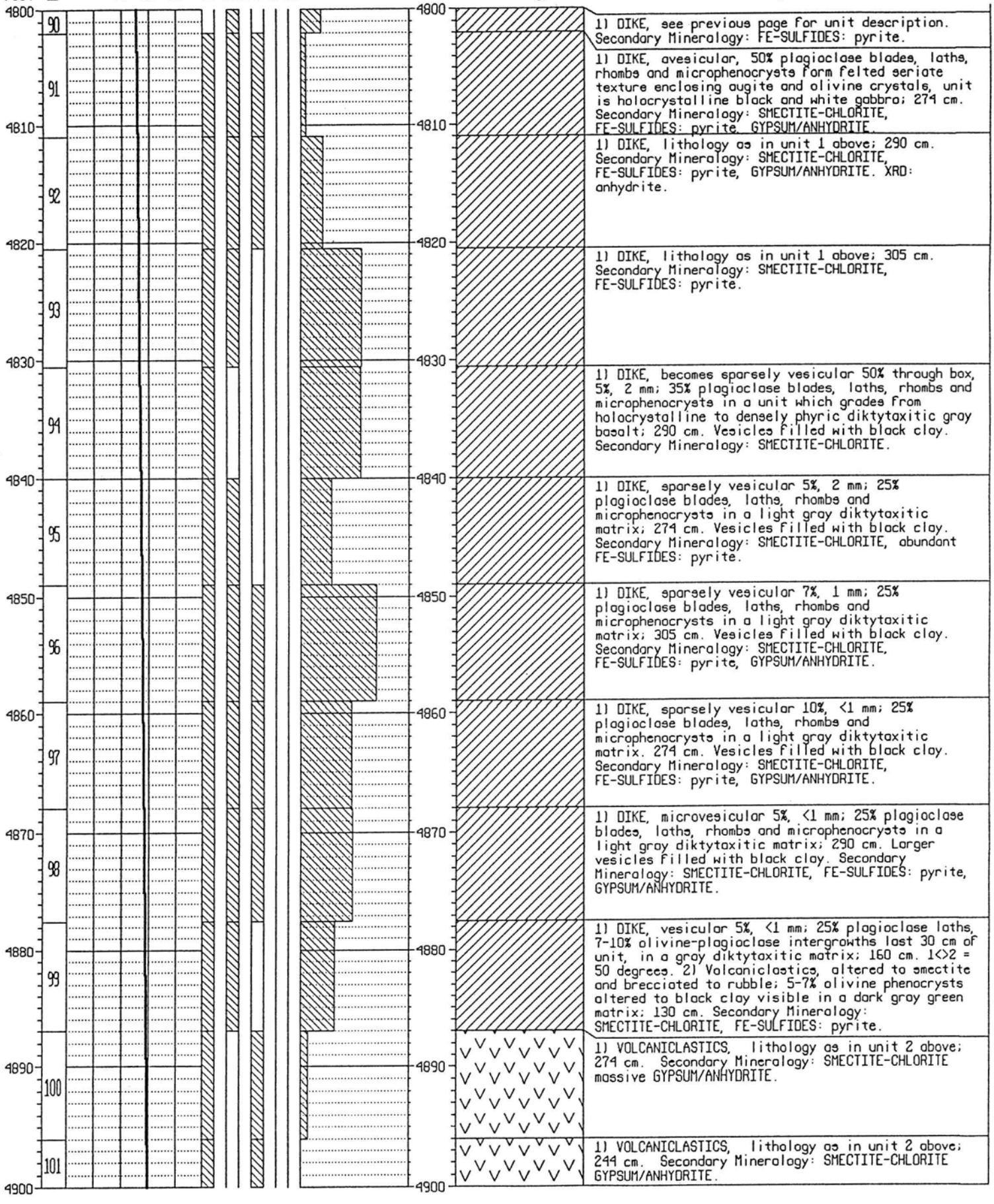
1) DIKE, lithology as in unit 1 above; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.

1) DIKE, lithology as in unit 1 above; 290 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1) DIKE, sparsely vesicular 5%, 2 mm; first 90 cm of box, grades to avesicular; 25% plagioclase blades, laths, rhombs, and microphenocrysts in a light gray diktytaxitic matrix grades to holocrystalline texture last 120 cm of box; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.

1) DIKE, avesicular, 50% plagioclase blades, laths, rhombs, and microphenocrysts form a felted, seriate, holocrystalline texture. Crystals are plagioclase, augite and olivine; 274 cm. Secondary Mineralogy: FE-SULFIDES: pyrite.

CATALOG OF SOH 2 CORE



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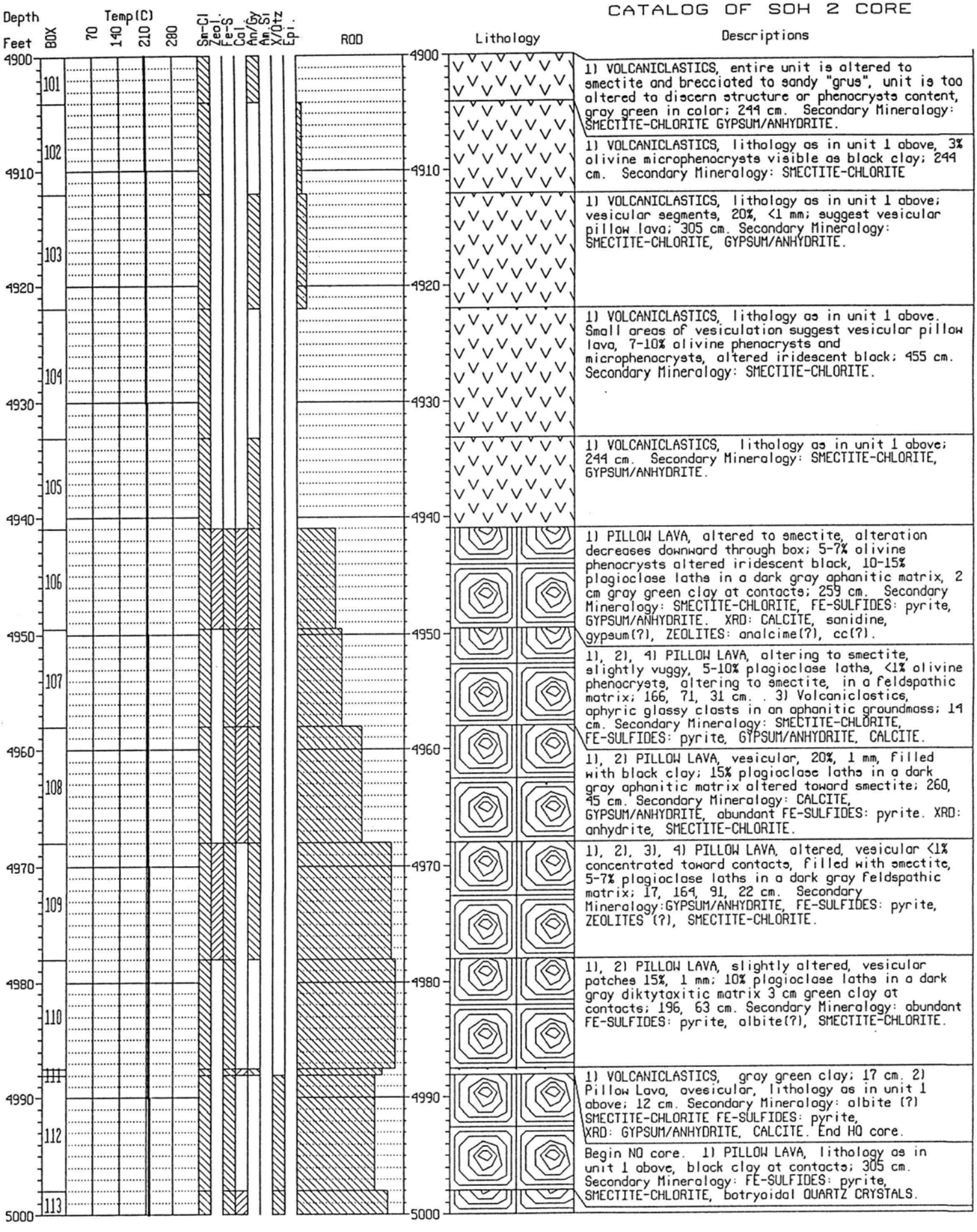

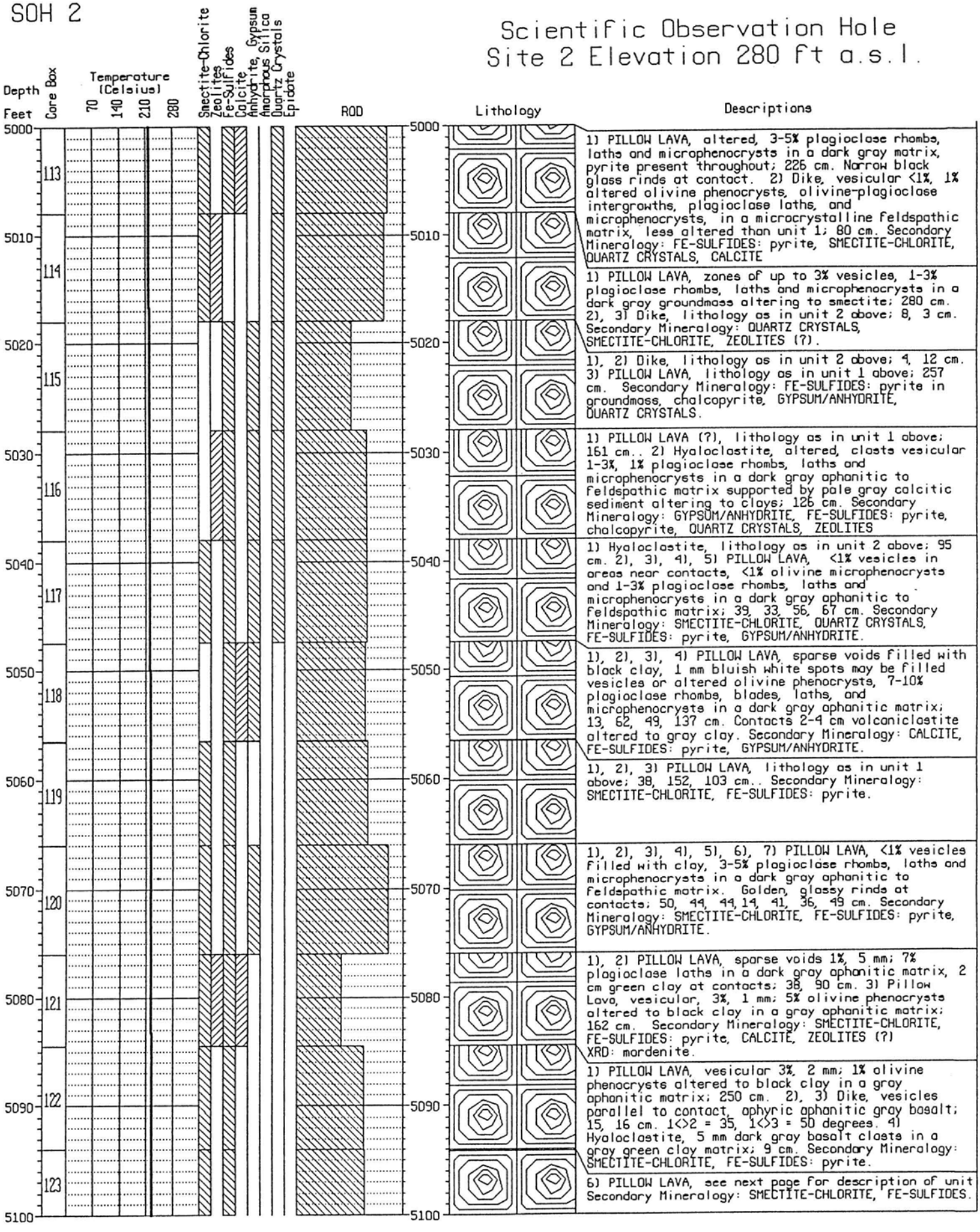
SOH 2
Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.
Depth
Feet
Core Box
Temperature
(Celsius)
70
140
210
280
Smectite-Chlorite
Zeolites
Fe-Sulfides
Calcite
Anhydrite, Gypsum
Amorphous Silica
Quartz Crystals
Epidote
ROD
Lithology
Descriptions
5000
5010
5020
5030
5040
5050
5060
5070
5080
5090
5100
113
114
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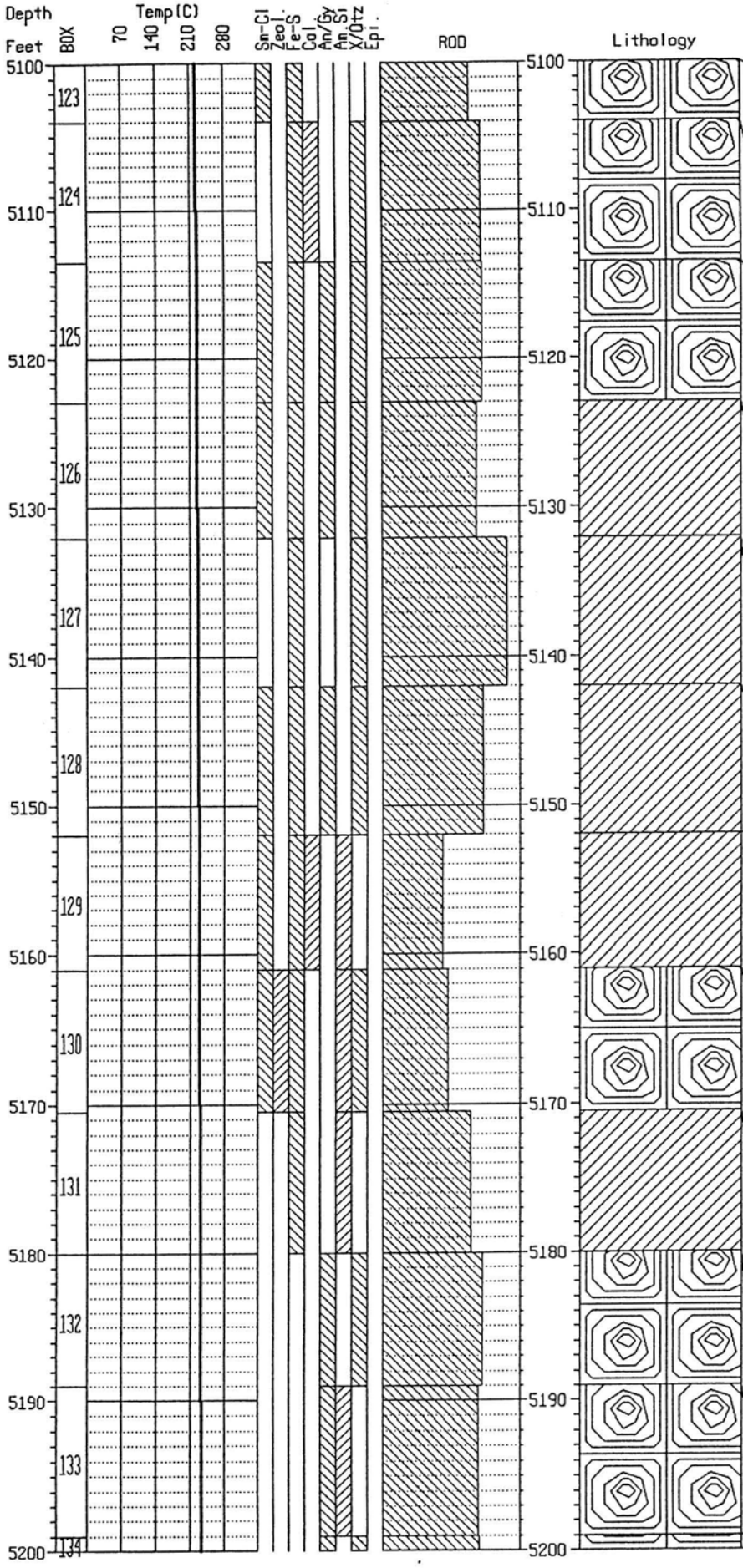
123
1) PILLOW LAVA, altered, 3-5% plagioclase rhombs, laths and microphenocrysts in a dark gray matrix, pyrite present throughout; 226 cm. Narrow black glass rinds at contact. 2) Dike, vesicular <1%, 1% altered olivine phenocrysts, olivine-plagioclase intergrowths, plagioclase laths, and microphenocrysts, in a microcrystalline feldspathic matrix, less altered than unit 1; 80 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, SMECTITE-CHLORITE, QUARTZ CRYSTALS, CALCITE
1) PILLOW LAVA, zones of up to 3% vesicles, 1-3% plagioclase rhombs, laths and microphenocrysts in a dark gray groundmass altering to smectite; 280 cm. 2), 3) Dike, lithology as in unit 2 above; 8, 3 cm. Secondary Mineralogy: QUARTZ CRYSTALS, SMECTITE-CHLORITE, ZEOLITES (?).
1), 2) Dike, lithology as in unit 2 above; 4, 12 cm. 3) PILLOW LAVA, lithology as in unit 1 above; 257 cm. Secondary Mineralogy: FE-SULFIDES: pyrite in groundmass, chalcopyrite, GYPSUM/ANHYDRITE, QUARTZ CRYSTALS.
1) PILLOW LAVA (?), lithology as in unit 1 above; 161 cm.. 2) Hyaloclastite, altered, clasts vesicular 1-3%, 1% plagioclase rhombs, laths and microphenocrysts in a dark gray aphanitic to feldspathic matrix supported by pale gray calcitic sediment altering to clays; 126 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE, FE-SULFIDES: pyrite, chalcopyrite, QUARTZ CRYSTALS, ZEOLITES
1) Hyaloclastite, lithology as in unit 2 above; 95 cm. 2), 3), 4), 5) PILLOW LAVA, <1% vesicles in areas near contacts, <1% olivine microphenocrysts and 1-3% plagioclase rhombs, laths and microphenocrysts in a dark gray aphanitic to feldspathic matrix; 39, 33, 56, 67 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
1), 2), 3), 4) PILLOW LAVA, sparse voids filled with black clay, 1 mm bluish white spots may be filled vesicles or altered olivine phenocrysts, 7-10% plagioclase rhombs, blades, laths, and microphenocrysts in a dark gray aphanitic matrix; 13, 62, 49, 137 cm. Contacts 2-4 cm volcaniclastite altered to gray clay. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
1), 2), 3) PILLOW LAVA, lithology as in unit 1 above; 38, 152, 103 cm.. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
1), 2), 3), 4), 5), 6), 7) PILLOW LAVA, <1% vesicles filled with clay, 3-5% plagioclase rhombs, laths and microphenocrysts in a dark gray aphanitic to feldspathic matrix. Golden, glassy rinds at contacts; 50, 44, 44, 14, 41, 36, 49 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.
1), 2) PILLOW LAVA, sparse voids 1%, 5 mm; 7% plagioclase laths in a dark gray aphanitic matrix, 2 cm green clay at contacts; 38, 90 cm. 3) Pillow Lava, vesicular, 3%, 1 mm; 5% olivine phenocrysts altered to black clay in a gray aphanitic matrix; 162 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, CALCITE, ZEOLITES (?) XRD: mordenite.
1) PILLOW LAVA, vesicular 3%, 2 mm; 1% olivine phenocrysts altered to black clay in a gray aphanitic matrix; 250 cm. 2), 3) Dike, vesicles parallel to contact, aphyric aphanitic gray basalt; 15, 16 cm. 1<>2 = 35, 1<>3 = 50 degrees. 4) Hyaloclastite, 5 mm dark gray basalt clasts in a gray green clay matrix; 9 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.
6) PILLOW LAVA, see next page for description of unit Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES.

CATALOG OF SOH 2 CORE



Descriptions

1), 3), 5) Hyaloclastite, aphyric, aphanitic, avesicular dark gray basalt clasts in gray green clay; 30, 22, 18 cm. 2), 4), 6) PILLOW LAVA, vesicular areas 20%, 1 mm, aphyric, aphanitic gray basalt; 46, 151, 28 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite.

1) PILLOW LAVA, vesicular areas 15%, 2 mm; aphyric gray basalt grades from aphanitic to diktytaxitic holocrystalline texture; 290 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, abundant FE-SULFIDES: pyrite,

1), 3) PILLOW LAVA (?), 10-15% plagioclase laths, 5% altered olivine microphenocrysts and olivine-plagioclase intergrowths, and <1% augite blades in a dark gray diktytaxitic matrix; 170, 78 cm. 1<>2 = 60 degrees. 2), 4) Dike, <1% vesicles, <<1 mm; <1% olivine microphenocrysts and plagioclase laths in a blue-gray aphanitic-feldspathic matrix, dark clays at contact; 7, 5 cm. Secondary Mineralogy:SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1), 2), 3), 5) DIKE, lithology as in unit 2 above; 5, 18, 21, 7 cm. Chill rinds and green clay at contacts. 4) Dike (?), 1% olivine microphenocrysts, 10% plagioclases laths, and <1% augite in a holocrystalline matrix; 41 cm. 5<>6 = 60 degrees. 6) Dike, sparsely vesicular, 1% olivine microphenocrysts and 3% plagioclase laths in a holocrystalline matrix; 196 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE.

1) DIKE, sparsely vesicular, 1%, 3 mm; aphyric diktytaxitic holocrystalline gray basalt; 305 cm. Secondary Mineralogy:QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1) DIKE, lithology as in unit 1 above, intrudes unit 2; 145 cm. 1<>2 = 65 degrees. 2) DIKE, 1% plagioclase laths in a holocrystalline matrix; 130 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1) DIKE, avesicular, 1% plagioclase laths in a gray feldspathic, diktytaxitic matrix; 139 cm. 2) Carbonate Mud, light gray matrix supports <1 mm angular basalt clasts rimmed with calcite; 15 cm. 1<>2 = 60, 2<>3 = 20 degrees. 3) Dike, avesicular, <1% olivine phenocrysts and microphenocrysts altered to black clay, and plagioclase laths in a gray aphanitic matrix; 120 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, FE-SULFIDES: pyrite, CALCITE.

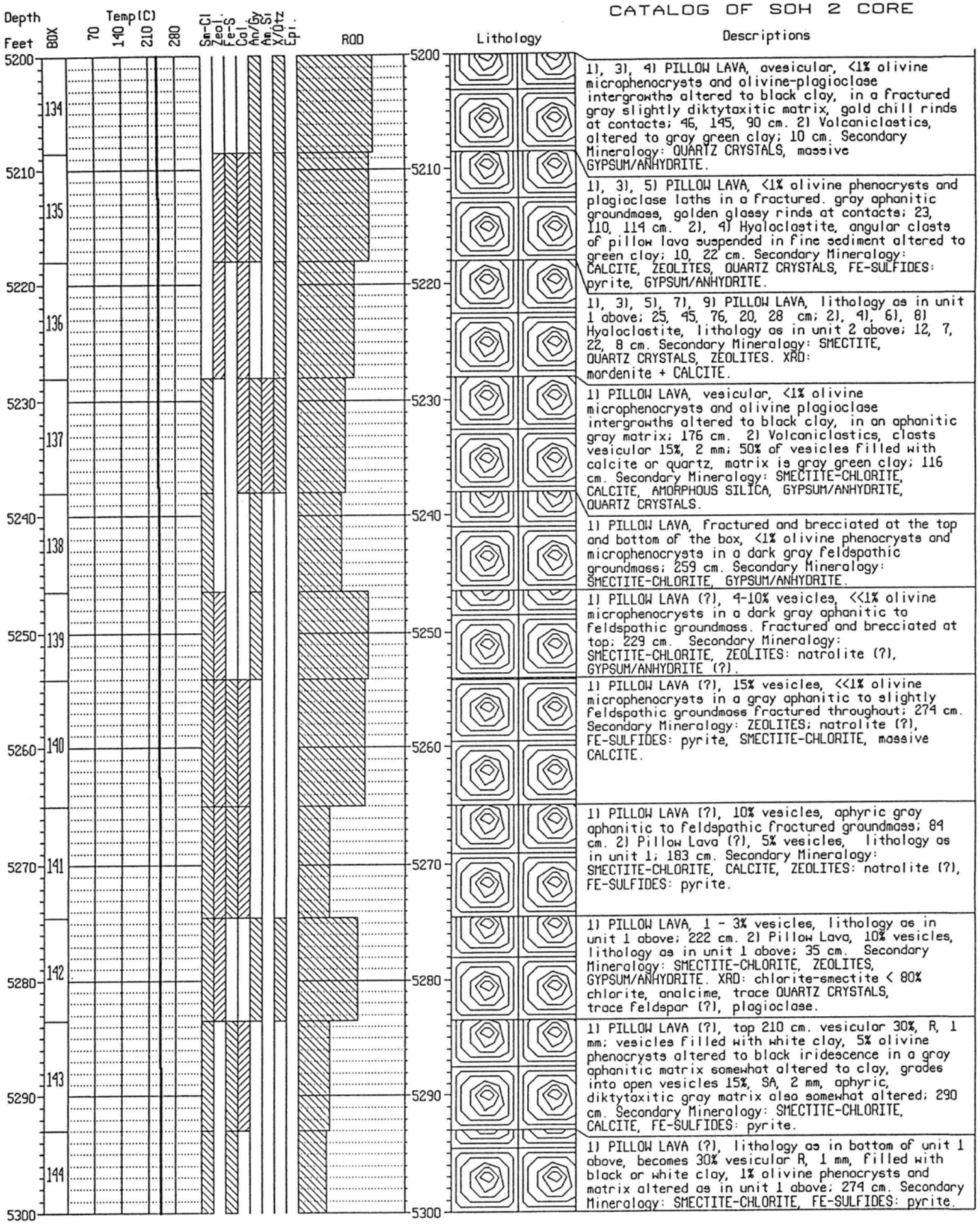
1), 2), 3), 5) PILLOW LAVA, altered, <1% altered olivine and plagioclase microphenocrysts in a gray feldspathic matrix, gold-green on fractures; 109, 37, 23, 128 cm. 4) Dike, <<1% vesicles, <1% olivine microphenocrysts and 1% plagioclase laths in a gray feldspathic matrix, intrudes pillow lava pile; 28 cm. Secondary Mineralogy: SMECTITE-CHLORITE, ZEOLITES: natrolite (?), AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1) Pillow Lava, avesicular, <1% olivine phenocrysts in a dark gray aphanitic matrix; 93 cm. 2) Volcaniclastics, altered to gray green clay; 26 cm.. 2<>3 = 45 degrees. 3), 4) DIKE, avesicular, <1% olivine phenocrysts altered to black clay, <1% plagioclase laths in a dark gray aphanitic matrix; 146, 70 cm. 3<>4 = 45, 4<>5 = 35 degrees. 5) Pillow Lava, avesicular, aphyric, diktytaxitic, feldspathic gray basalt; 4 cm. Secondary Mineralogy: AMORPHOUS SILICA, FE-SULFIDES: pyrite.

1) PILLOW LAVA, avesicular, <1% olivine microphenocrysts and olivine-plagioclase intergrowths altered to black clay in a diktytaxitic gray matrix; 274 cm. Secondary Mineralogy: QUARTZ CRYSTALS, massive GYPSUM/ANHYDRITE.

1) PILLOW LAVA, lithology as in unit 1 above; 305 cm. Secondary Mineralogy: AMORPHOUS SILICA, GYPSUM/ANHYDRITE. See next page for BOX 134.

CATALOG OF SOH 2 CORE



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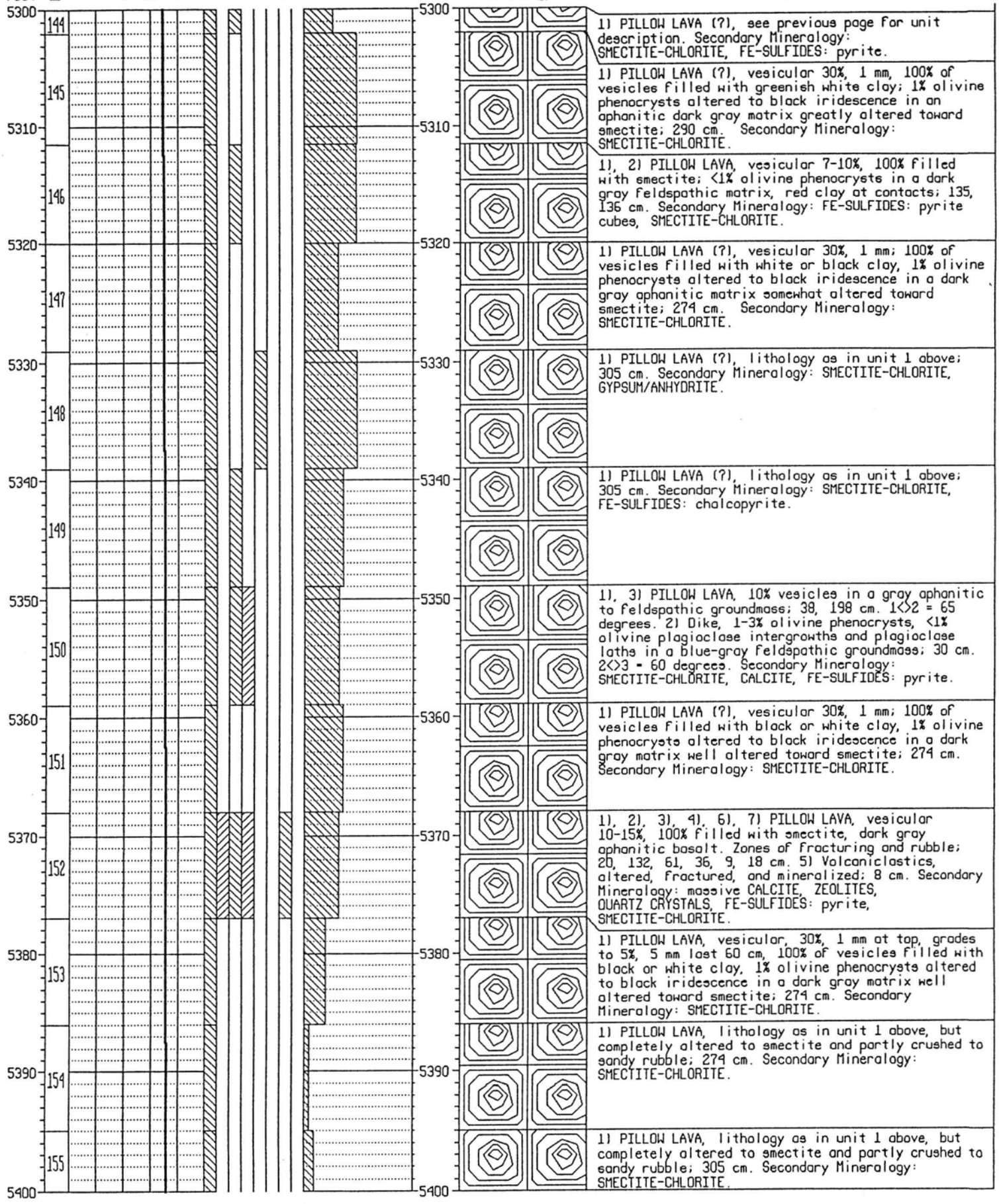

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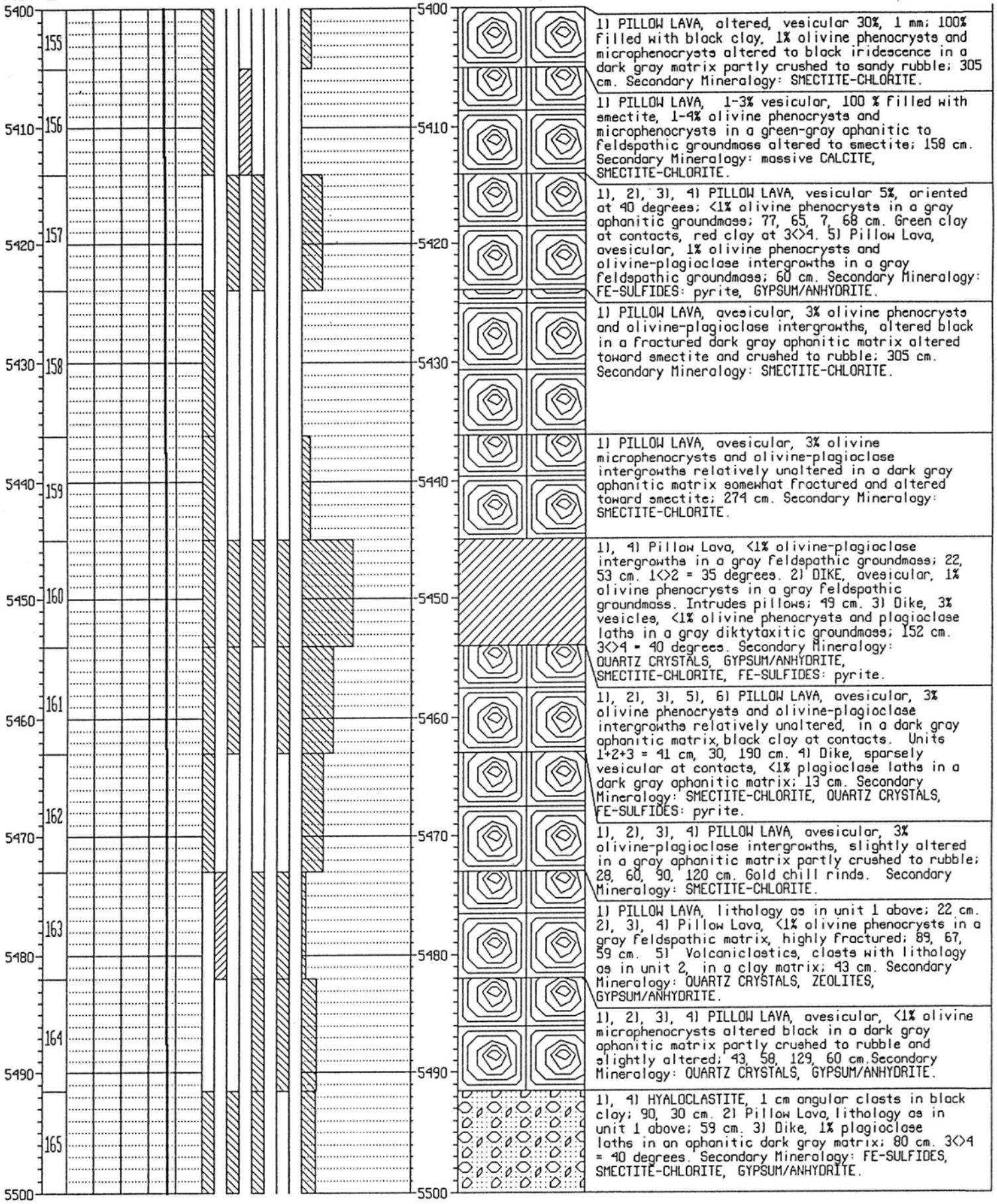

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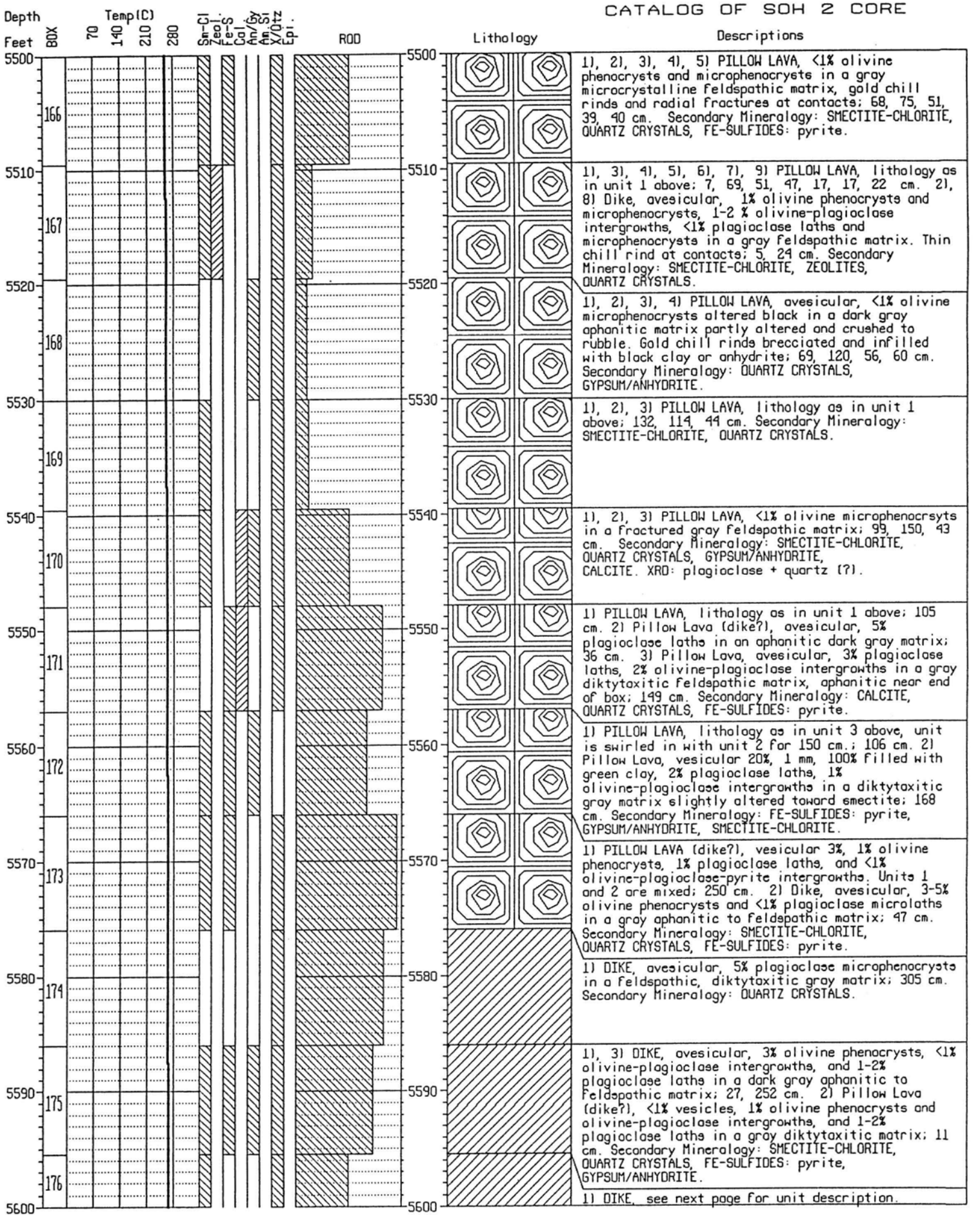

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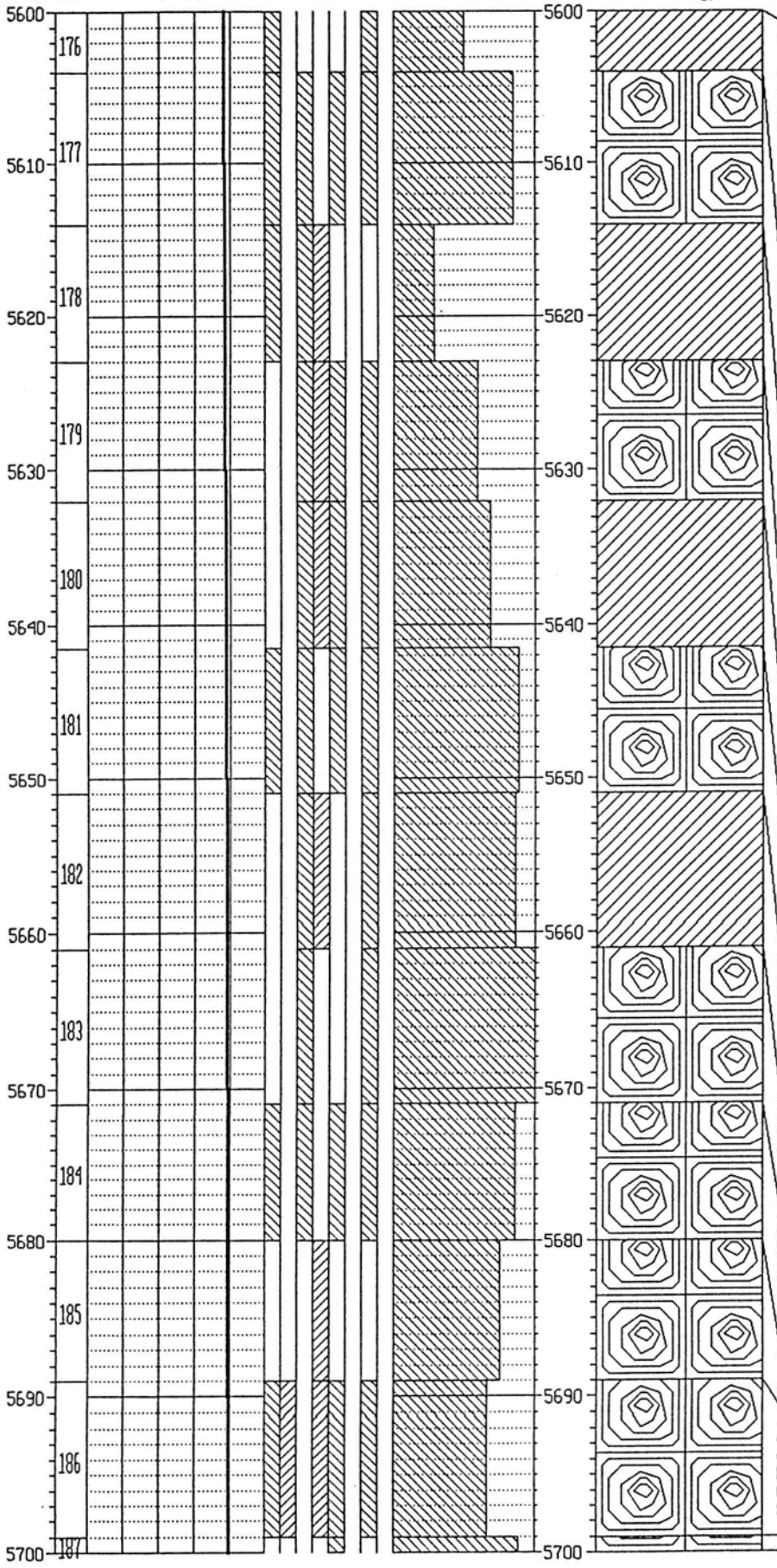


Descriptions

1) DIKE, avesicular, 1% plagioclase microphenocrysts in a feldspathic diktytaxitic gray matrix; 70 cm. 1<>2 = 0 degrees. 2) Dike, avesicular, 1% olivine microphenocrysts altered black, <1% plagioclase microphenocrysts in a light gray diktytaxitic feldspathic matrix; 149 cm. 2<>3 = 35 degrees. 3) Dike (?), sparsely vesicular, 5% 2 mm, 100% filled with white clay, <1% olivine microphenocrysts, <1% plagioclase laths in a mottled diktytaxitic feldspathic matrix slightly altered toward smectite; 45 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS.

1) PILLOW LAVA, vesicular <1%, 5 mm; 1% olivine phenocrysts, <1% plagioclase laths in a gray diktytaxitic matrix; 187 cm. 1<>2 = 40 degrees. 2) Dike, 2% olivine phenocrysts, <1% plagioclase laths in a gray aphanitic matrix altering to dark green/black clays; 109 cm. Secondary mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE, and occasional albite (?).

1) DIKE, lithology as in unit 2 above; 198 cm. 2) Pillow Lava, avesicular, 1% plagioclase blades and laths in a gray green matrix altered toward smectite; 36 cm. 3) Pillow Lava, avesicular, 1% olivine-plagioclase intergrowths, 2% plagioclase laths in an aphanitic dark gray matrix; 90 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, SMECTITE-CHLORITE.

1), 2), 3) PILLOW LAVA, sparsely vesicular 5%, 1 mm; <1% olivine-plagioclase intergrowths, 2% plagioclase laths in slightly diktytaxitic gray matrix; 119, 51, 125 cm. Secondary Mineralogy: CALCITE, FE-SULFIDES: pyrite, QUARTZ CRYSTALS, GYPSUM/ANHYDRITE.

1) Pillow Lava, lithology as in unit 1 above; 117 cm. 1<>2 = 90 degrees. 2) DIKE, avesicular, <1% plagioclase microphenocrysts in a dark gray matrix aphanitic to diktytaxitic feldspathic; 173 cm. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1) Dike, lithology as in unit 2 above; 54 cm. 2) PILLOW LAVA, <1% vesicles, 2-3% olivine phenocrysts, <1% plagioclase laths in a gray diktytaxitic matrix; 197 cm. 3) Dike, lithology as in unit 2 above; 90 cm. 4) Pillow Lava, lithology as in unit 2; 6 cm. Secondary Mineralogy: GYPSUM/ANHYDRITE FE-SULFIDES: pyrite, SMECTITE-CHLORITE, QUARTZ CRYSTALS.

1) DIKE, avesicular, aphyric dark gray aphanitic basalt; 3 cm. 2) Pillow Lava, vesicular 10%, 3 mm, 25% of vesicles filled with gray-green clay, 2% plagioclase laths in a diktytaxitic feldspathic gray matrix; 302 cm.. 1<>2 = 80 degrees. Secondary Mineralogy: CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

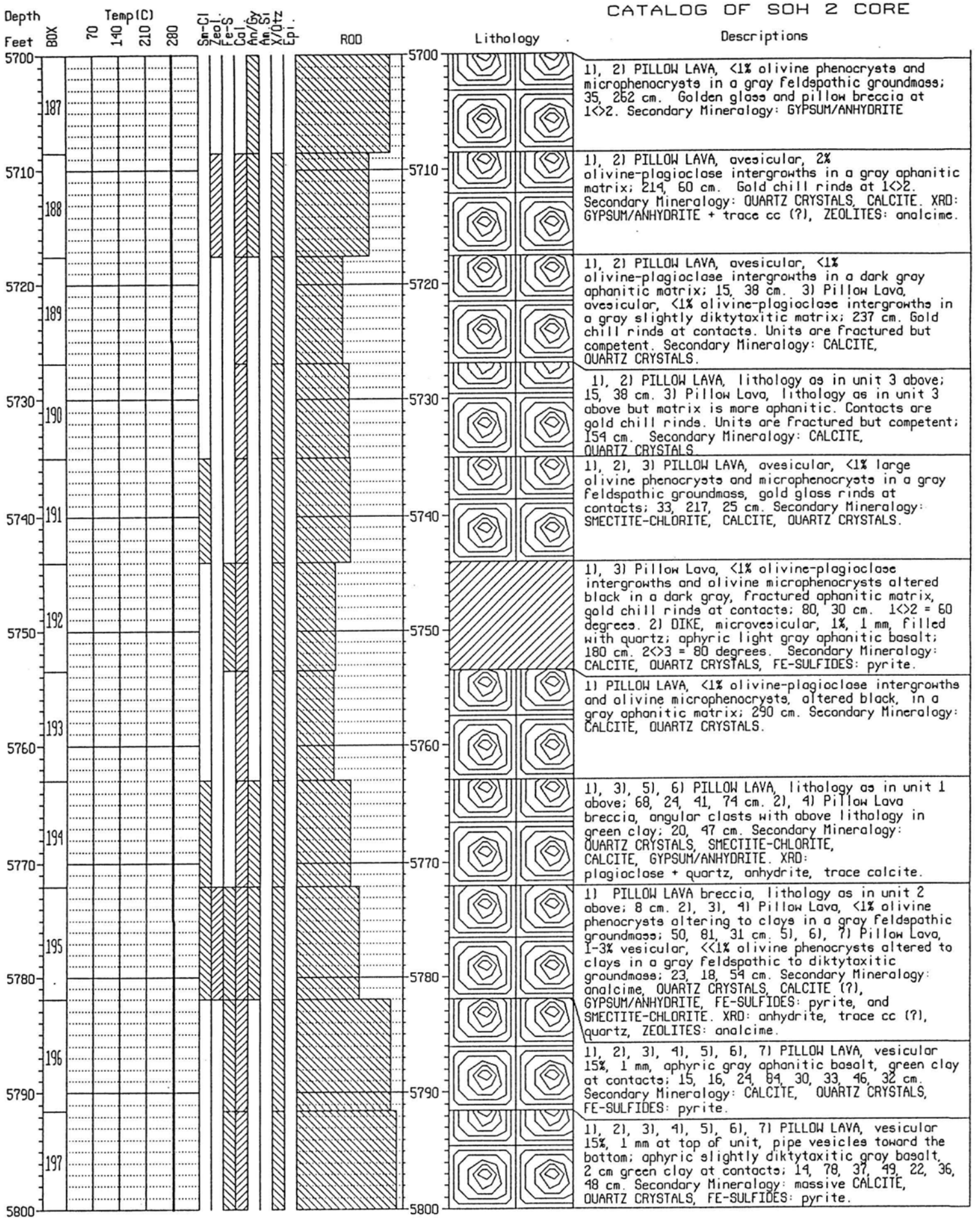
1) PILLOW LAVA, lithology as in unit 2 above. Dark gray unit with same lithology is swirled in 30 cm above contact; 297 cm. 2) Pillow Lava breccia, avesicular, aphyric clasts with distinct chill rinds in gray green clay; 8 cm. Secondary Mineralogy: QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1), 3) PILLOW LAVA, <1% olivine phenocrysts in a gray feldspathic matrix; 241, 41 cm. 2) Pillow Lava, (dike?), 1% olivine phenocrysts, 1% plagioclase laths in a dark gray diktytaxitic matrix; 7 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1) PILLOW LAVA, avesicular, <1% olivine-plagioclase intergrowths in a slightly diktytaxitic light gray matrix. 274 cm. Secondary Mineralogy: CALCITE.

1), 2), 3), 4) PILLOW LAVA, lithology as in unit 1 above, gold chill rinds and radial fractures at contact; 15, 75, 117, 68 cm. Secondary Mineralogy:SMECTITE-CHLORITE, CALCITE, GYPSUM/ANHYDRITE, ZEOLITES, QUARTZ CRYSTALS.
See next page for description of BOX 187.

CATALOG OF SOH 2 CORE



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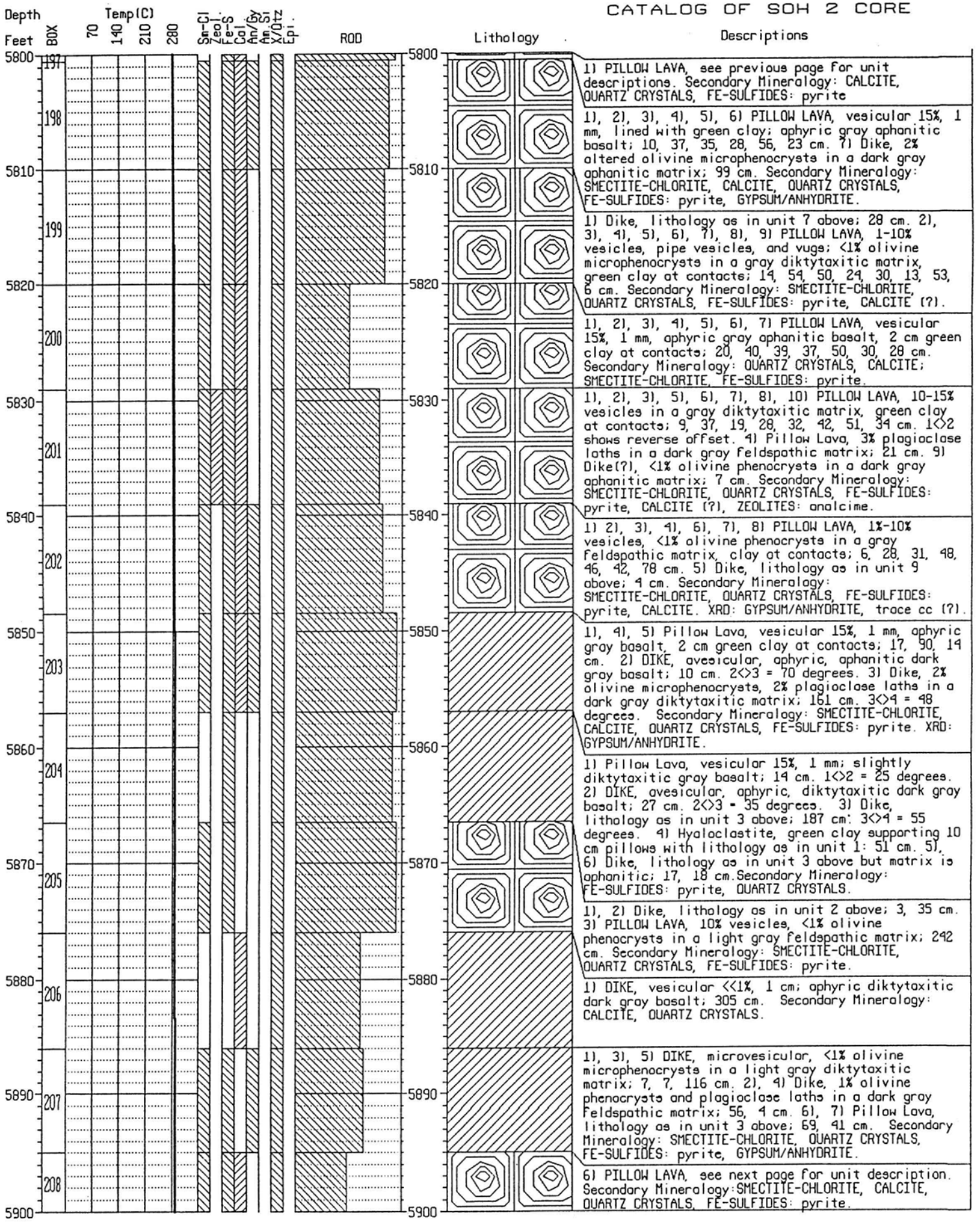

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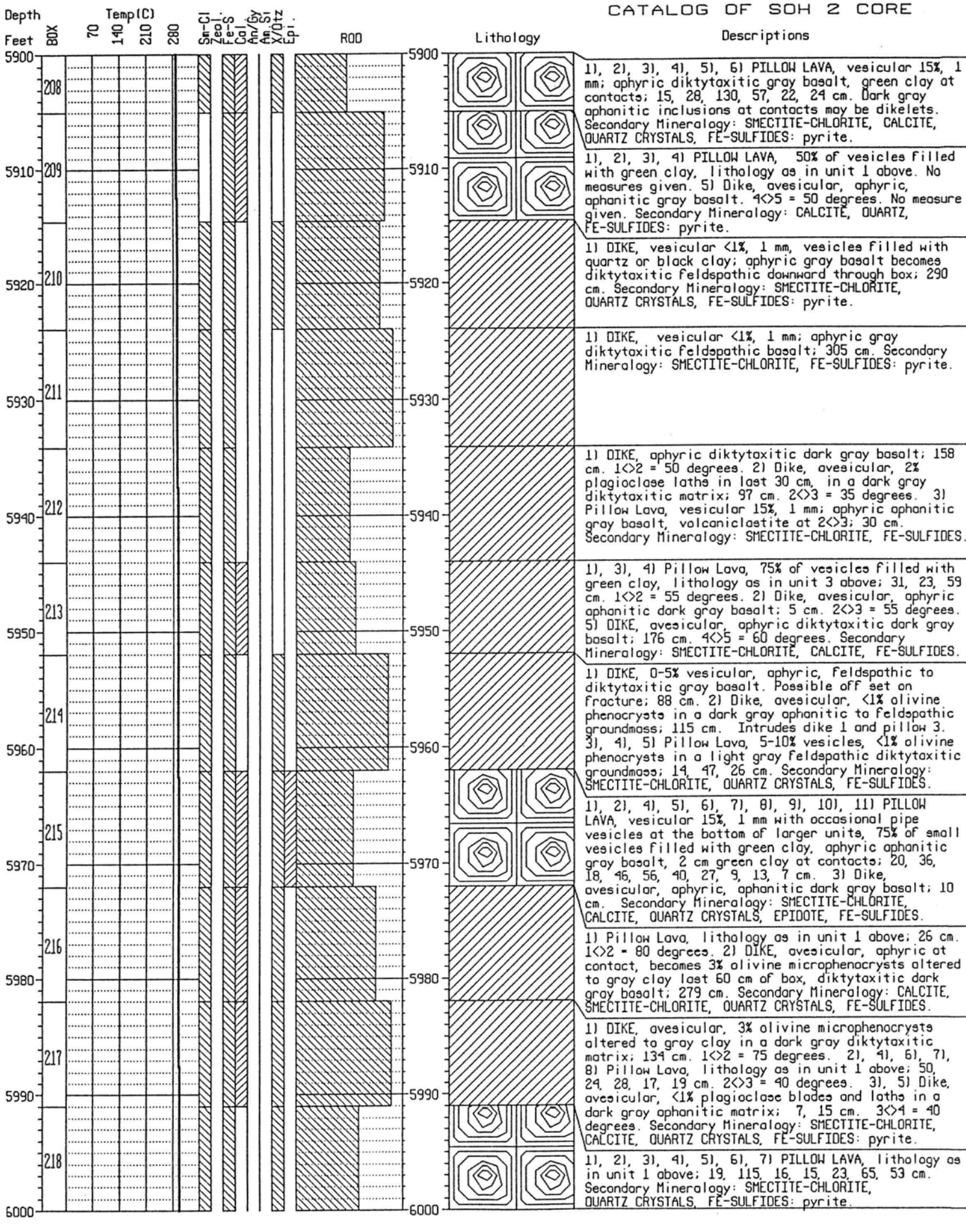
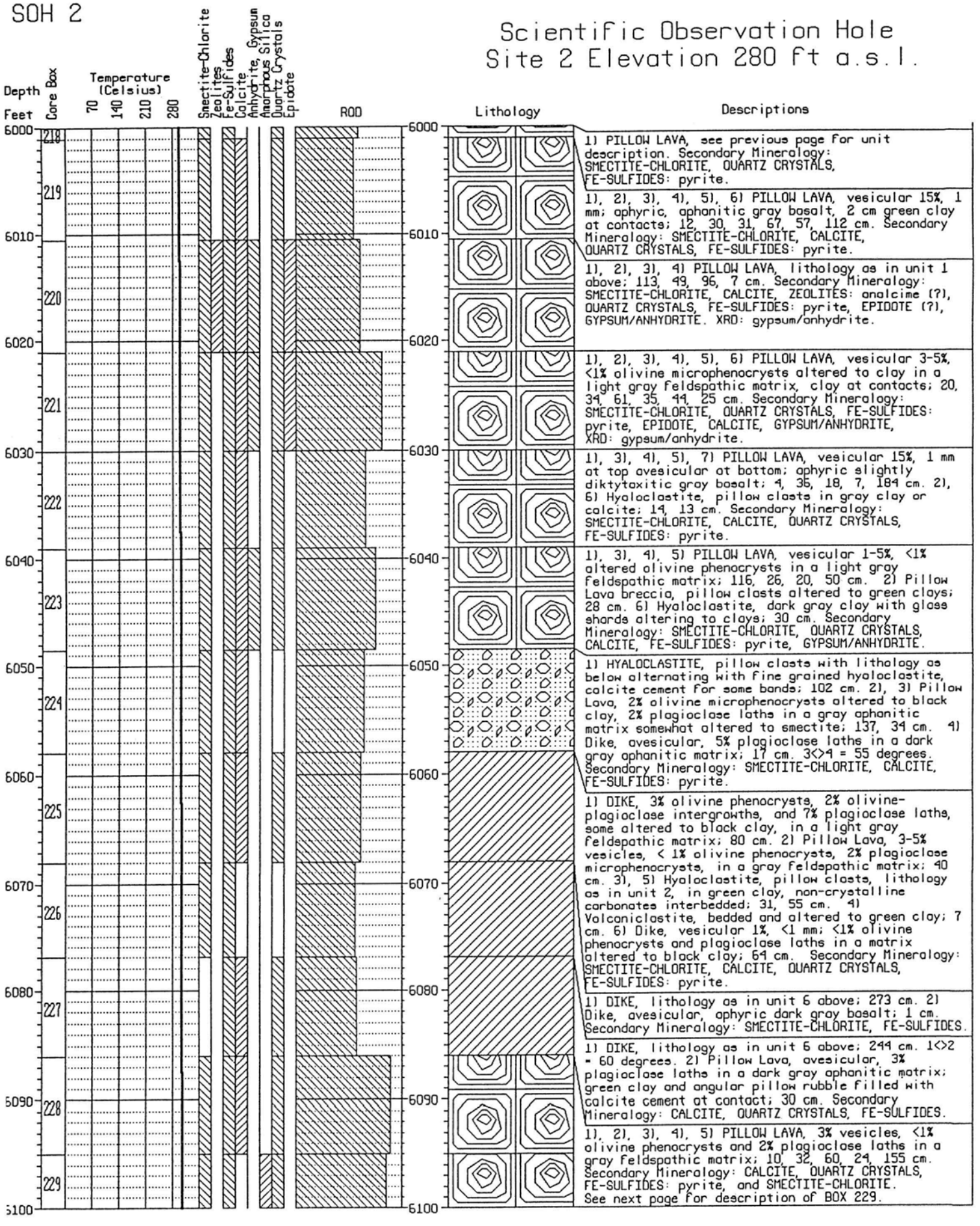


SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.



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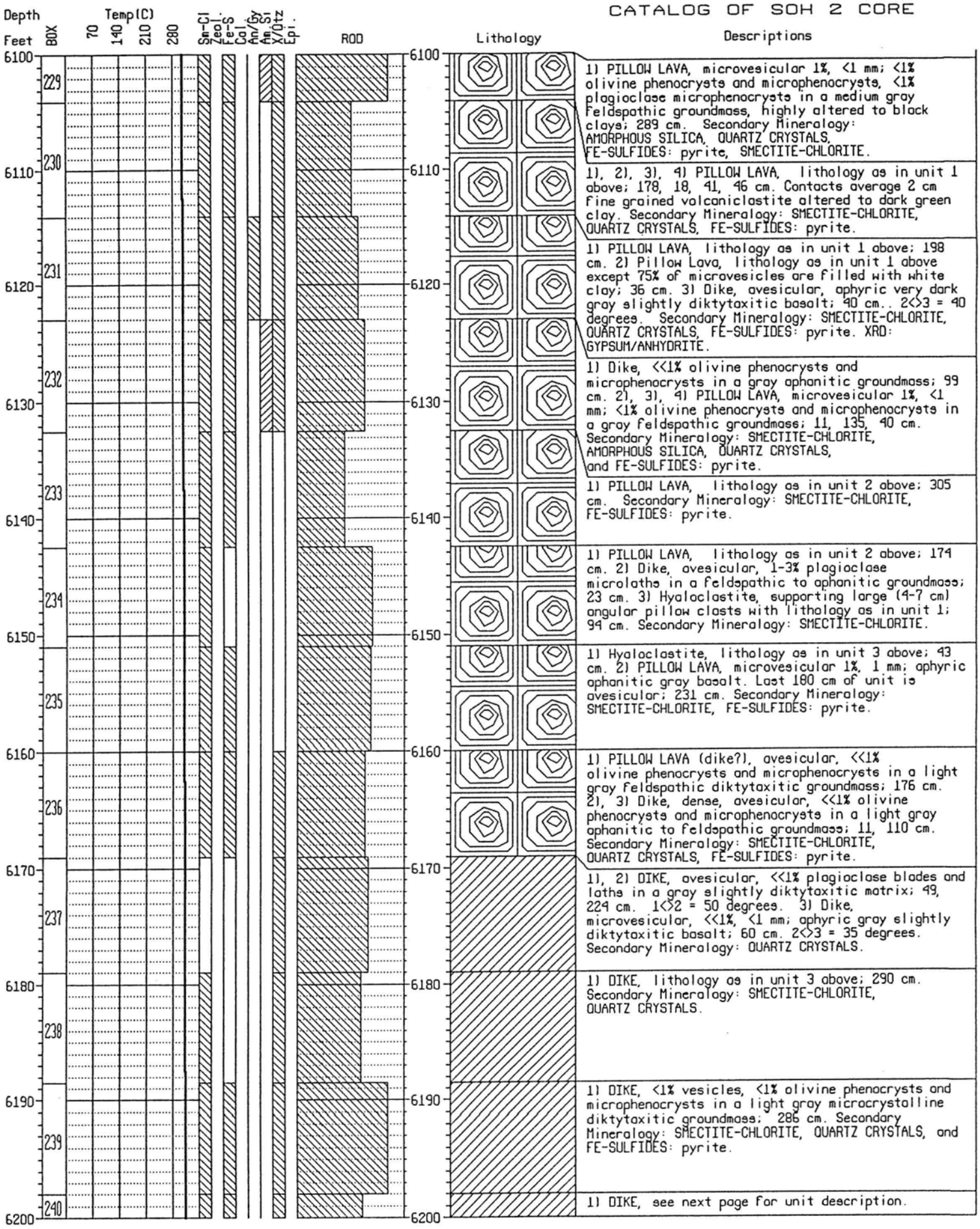

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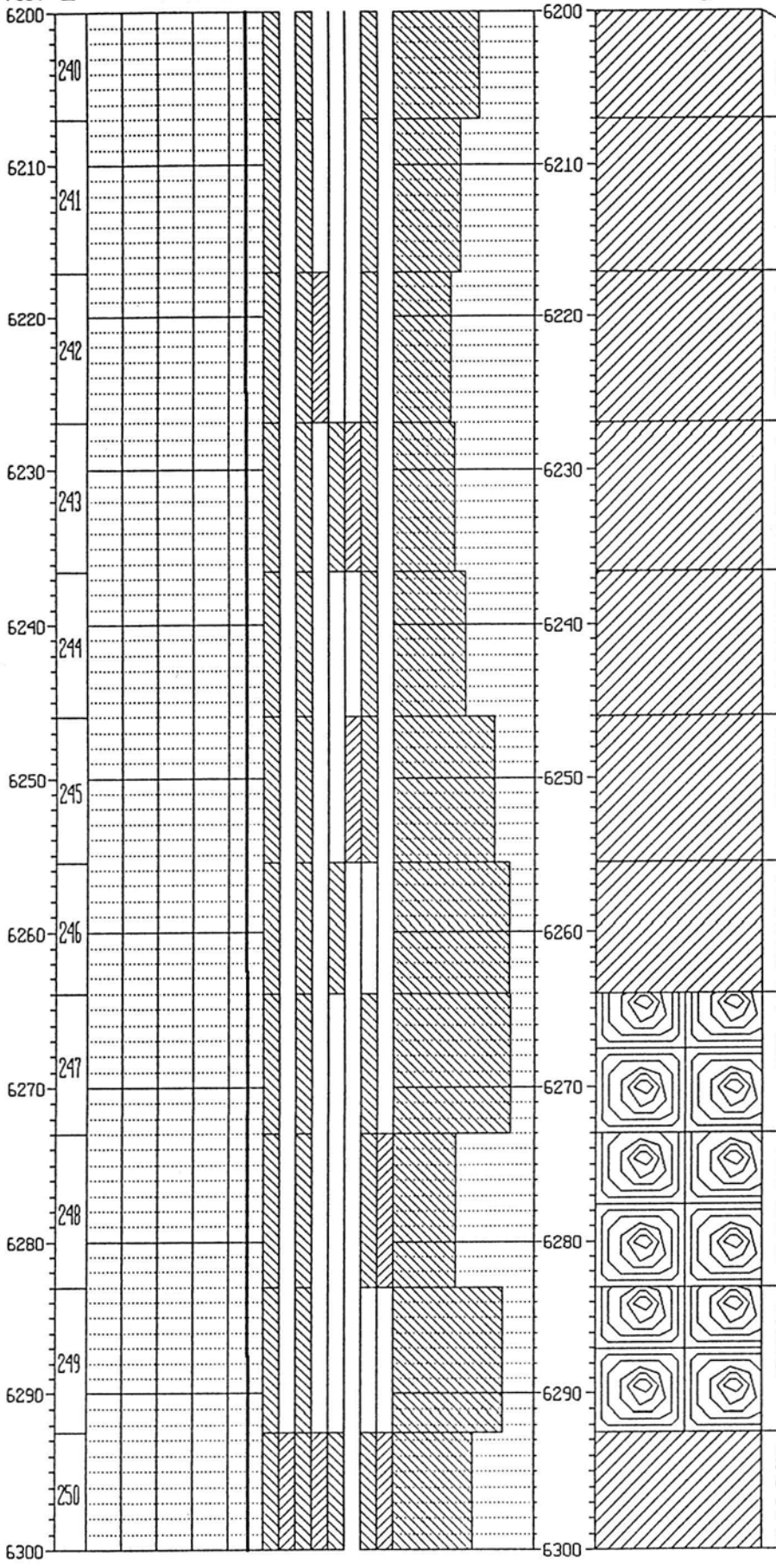


Descriptions

1) DIKE, <1% vesicles, <<1% olivine phenocrysts in a light gray microcrystalline diktytaxitic groundmass; 290 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, and FE-SULFIDES: pyrite.

1) DIKE, avesicular aphyric very slightly diktytaxitic light gray basalt; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1), 3), 5), 6) DIKE, avesicular aphyric aphanitic light gray basalt; 86, 44, 40, 80 cm. 3<>4 = 0, 4<>5 = 40, 5<>6 = 70 degrees. 2), 4) Hyaloclastite, small clasts with lithology as in unit 1 in gray clay; 52, 3 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite altered red.

1), 3) DIKE, <1% vesicles; <<1% olivine phenocrysts in a light gray feldspathic groundmass; 164, 71 cm. 2) Pillow Lava, 1-3% vesicles, 1% olivine phenocrysts in a dark gray altered groundmass; 41 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, and GYPSUM/ANHYDRITE.

1) DIKE, avesicular, aphyric, aphanitic light gray basalt; 81 cm.. 2) Dike, avesicular, <<1% plagioclase laths in a light gray aphanitic matrix; 209 cm. 1<>2 = 40 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1) DIKE, avesicular, <1% olivine phenocrysts and plagioclase laths in a light gray feldspathic groundmass; 281 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1) DIKE, avesicular, <<1% altered olivine phenocrysts in a light gray feldspathic groundmass; 248 cm. 2) Pillow Lava, aphyric, 1-3% vesicles filled with smectite in a gray aphanitic to feldspathic groundmass; 32 cm. Secondary Mineralogy: SMECTITE-CHLORITE, GYPSUM/ANHYDRITE and FE-SULFIDES: pyrite.

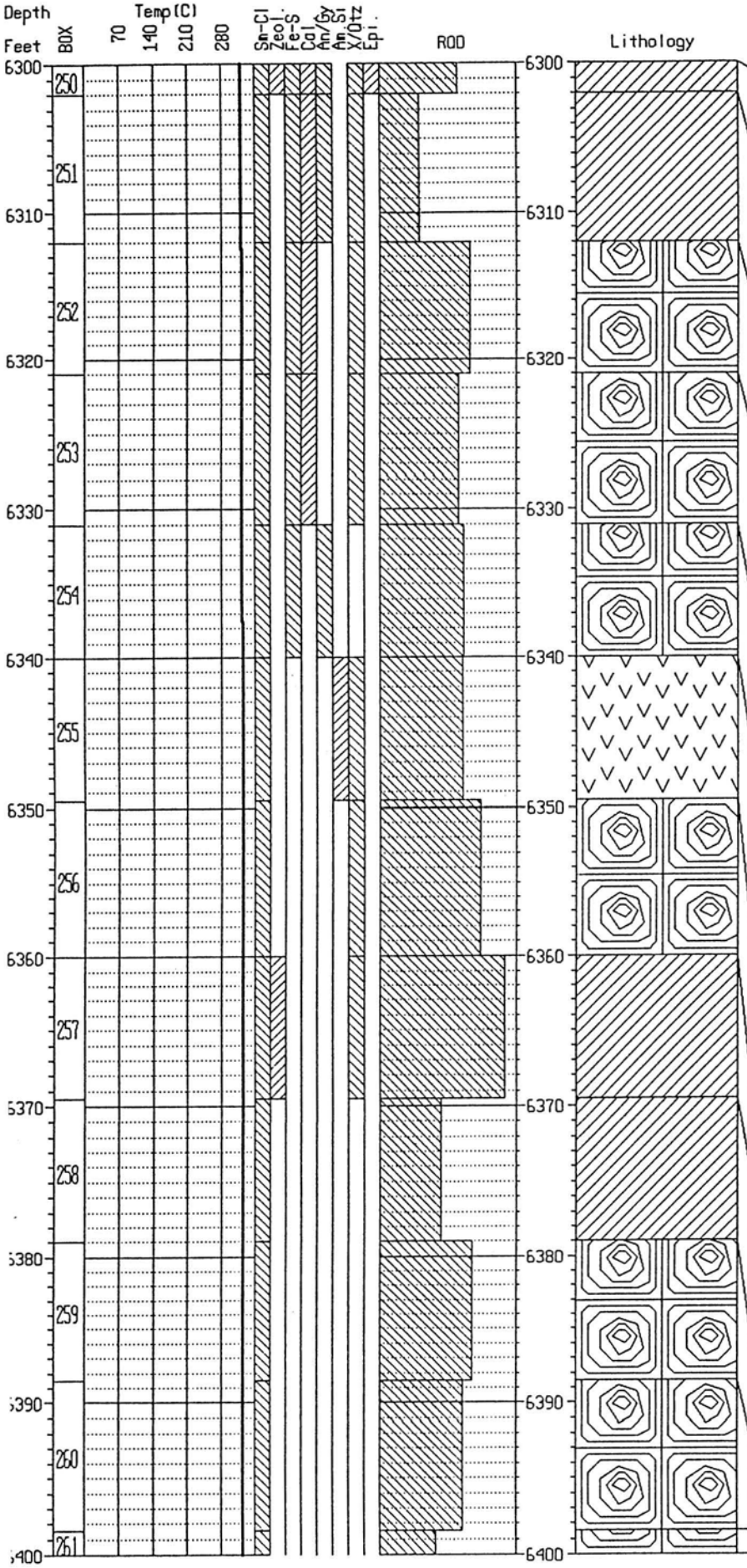
1), 2), 3), 4), 5), 6), 7) PILLOW LAVA, lithology as in unit 2 above; 3, 26, 32, 31, 29, 150, 12 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1), 5) PILLOW LAVA, avesicular, aphyric, aphanitic gray basalt; 69, 90 cm. 2) Hyaloclastite, small (1 cm) clasts with lithology as above in green clay; 102 cm. 3), 4) Dike, avesicular, <<1% plagioclase blades and laths in a dark gray aphanitic matrix; 95, 10 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, EPIDOTE.

1), 3), 4), 5), 6), 7) PILLOW LAVA, 1% vesicles filled with smectite, in a light gray, aphanitic, altered groundmass; 27, 90, 26, 94, 20, 20 cm. Secondary Mineralogy: SMECTITE-CHLORITE and FE-SULFIDES: pyrite.

1), 3), 5) Pillow Lava, 3% vesicles, aphyric gray feldspathic basalt altering to smectite; 51, 62, 80 cm. 2), 4) DIKE, avesicular, <1% olivine phenocrysts altering to clays in a medium gray aphanitic matrix; 41, 151 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES:

CATALOG OF SOH 2 CORE



Descriptions

2) DIKE, see previous page for unit description. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, ZEOLITES, QUARTZ CRYSTALS, FE-SULFIDES: pyrite, EPIDOTE, GYPSUM/ANHYDRITE, albite (?) or adularia.

1) Pillow Lava, aphyric aphanitic gray basalt; 61 cm. 2) DIKE, aphyric diktytaxitic gray basalt; 180 cm. 2<>3 = 0 degrees. 3) Dike, 5% plagioclase laths in a dark gray aphanitic matrix; 80 cm. 3<>4 = 45 degrees. 4) Pillow Lava, lithology as in unit 1, fractured to rubble and altering to smectite; 40 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES, GYPSUM/ANHYDRITE.

1) PILLOW LAVA, vesicular 15%, 1 mm; grades to avesicular aphanitic light gray basalt, black clasts with white rims in green clay at contact; 100 cm. 2) Pillow Lava, aphyric light gray aphanitic to diktytaxitic basalt; 174 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite altered red.

1) PILLOW LAVA, <1% plagioclase laths in a light gray diktytaxitic matrix, clay at contacts as above; 114 cm. 2) Pillow Lava, vesicular 5%, <1 mm, 100% filled with green clay; aphyric aphanitic light gray basalt; 88 cm. 3), 4) Pillow Lava, aphyric, aphanitic gray basalt; 14, 17 cm. 5) Pillow Lava, vesicular 15%, lithology as in unit 2; 44 cm. Secondary Mineralogy: SMECTITE-CHLORITE, massive CALCITE, QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1) PILLOW LAVA, lithology as in unit 2 above; 38 cm. 2) Pillow Lava, 5% olivine phenocrysts altered to black clay in an aphanitic gray matrix; 84 cm. 3), 4), 5) Pillow Lava, 1% olivine phenocrysts altered as in unit 2, in a diktytaxitic matrix; 30, 40, 25 cm. 6) Pillow Lava, lithology as in unit 2 above; 47 cm. Secondary Mineralogy: SMECTITE-CHLORITE, FE-SULFIDES: pyrite, GYPSUM/ANHYDRITE.

1) Pillow Lava, lithology as in unit 2 above; 23 cm. 2), 3), 4), 6), 9) VOLCANICLASTICS, bedded, altered to green clay; 13, 37, 16, 25, 27 cm. 5), 8), 11) Pillow Lava, 15% altered olivine phenocrysts in a blue-black matrix; 23, 22, 13 cm. Unit 5 offset. 7) Carbonate mud and volcaniclastite sand; 130 cm. 10) Dike, <1% olivine phenocrysts and plagioclase laths in a light gray aphanitic matrix; 79 cm. Secondary Mineralogy: SMECTITE-CHLORITE, AMORPHOUS SILICA, QUARTZ CRYSTALS.

1) Dike, lithology as in unit 10 above; 3 cm. 1<>2 = 65 degrees. 2), 3), 5), 6) PILLOW LAVA, 30% olivine phenocrysts altered to white clay in a dark gray matrix altered to smectite; 48, 26, 62, 11 cm. 4), 7) Hyaloclastite, altered, calcareous, 2 cm clasts near contacts; 12, 8 cm. 8) Dike, 10% plagioclase laths in a gray aphanitic matrix; 97 cm. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ CRYSTALS.

1) DIKE, 1% olivine phenocrysts and 5% plagioclase laths altering to clay in a dark gray matrix; 289 cm. Secondary Mineralogy: QUARTZ CRYSTALS, SMECTITE-CHLORITE, ZEOLITES: analcime.

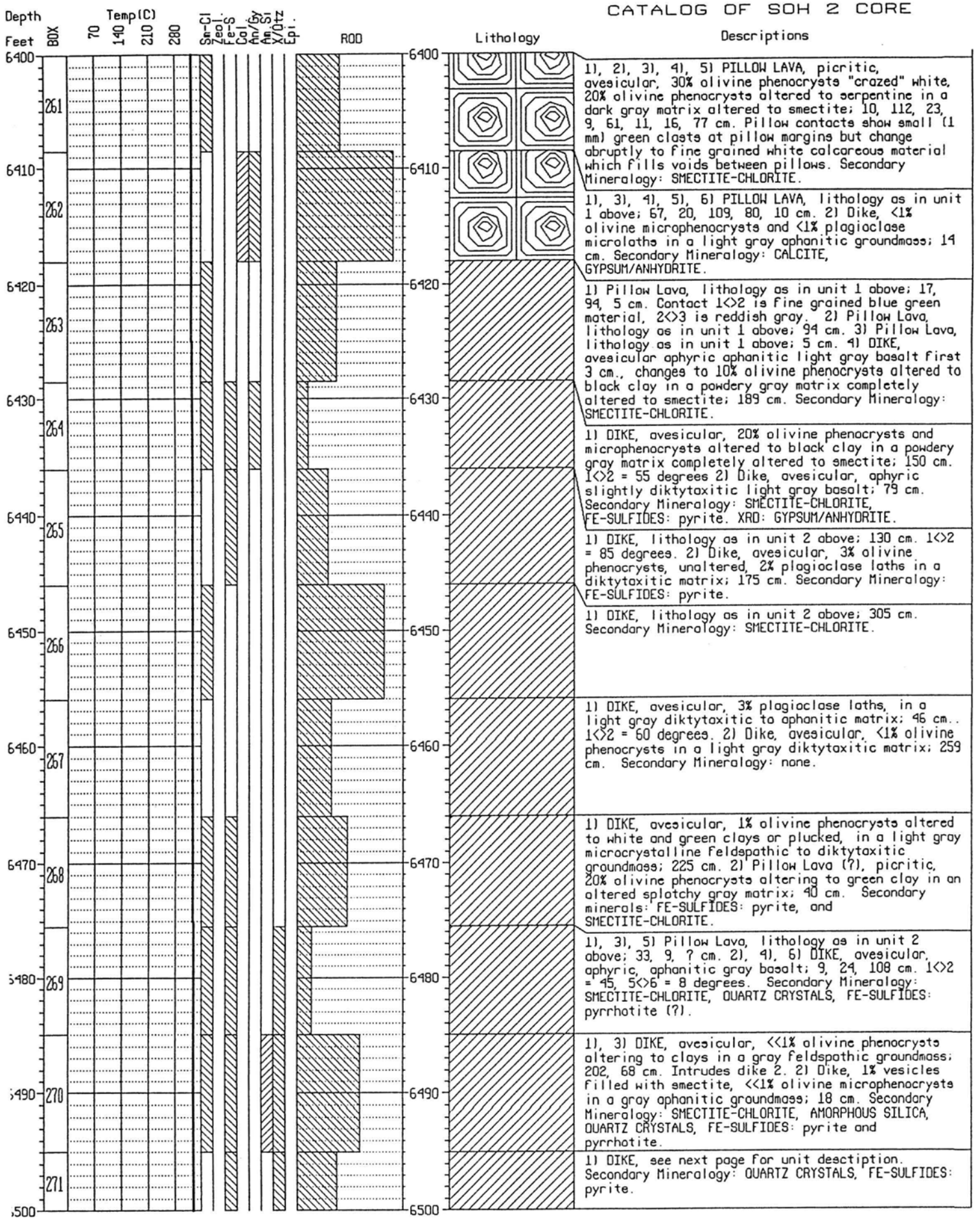
1) DIKE, lithology as in unit 8 above; 79 cm. 1<>2 = 80 degrees. 2) Pillow Lava, lithology as in unit 2 above but 10% olivine; 43 cm. 3) Pillow Lava, lithology as in unit 2 above but 20% olivine; 68 cm. 4) Pillow Lava, lithology as in unit 2 above; 26 cm. 5) Dike, <1% plagioclase laths in a gray aphanitic to diktytaxitic matrix, last 30 cm altered to clay and olivine phenocrysts visible; 80 cm. 4<>5 = 50 degrees. Secondary Mineralogy: SMECTITE-CHLORITE.

1) Dike, lithology as in unit 5 above; 59 cm. 2), 4), 6), 7), 8) PILLOW LAVA, lithology as in unit 2 above; 18, 18, 52, 79, 26 cm. 3), 5) Carbonate, mixed with volcaniclastite sand; 5, 12 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1), 2), 3), 4), 5), 6) PILLOW LAVA, lithology as in unit 2 above; 60, 14, 92, 51, 41, 14 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, see next page for unit description.

CATALOG OF SOH 2 CORE



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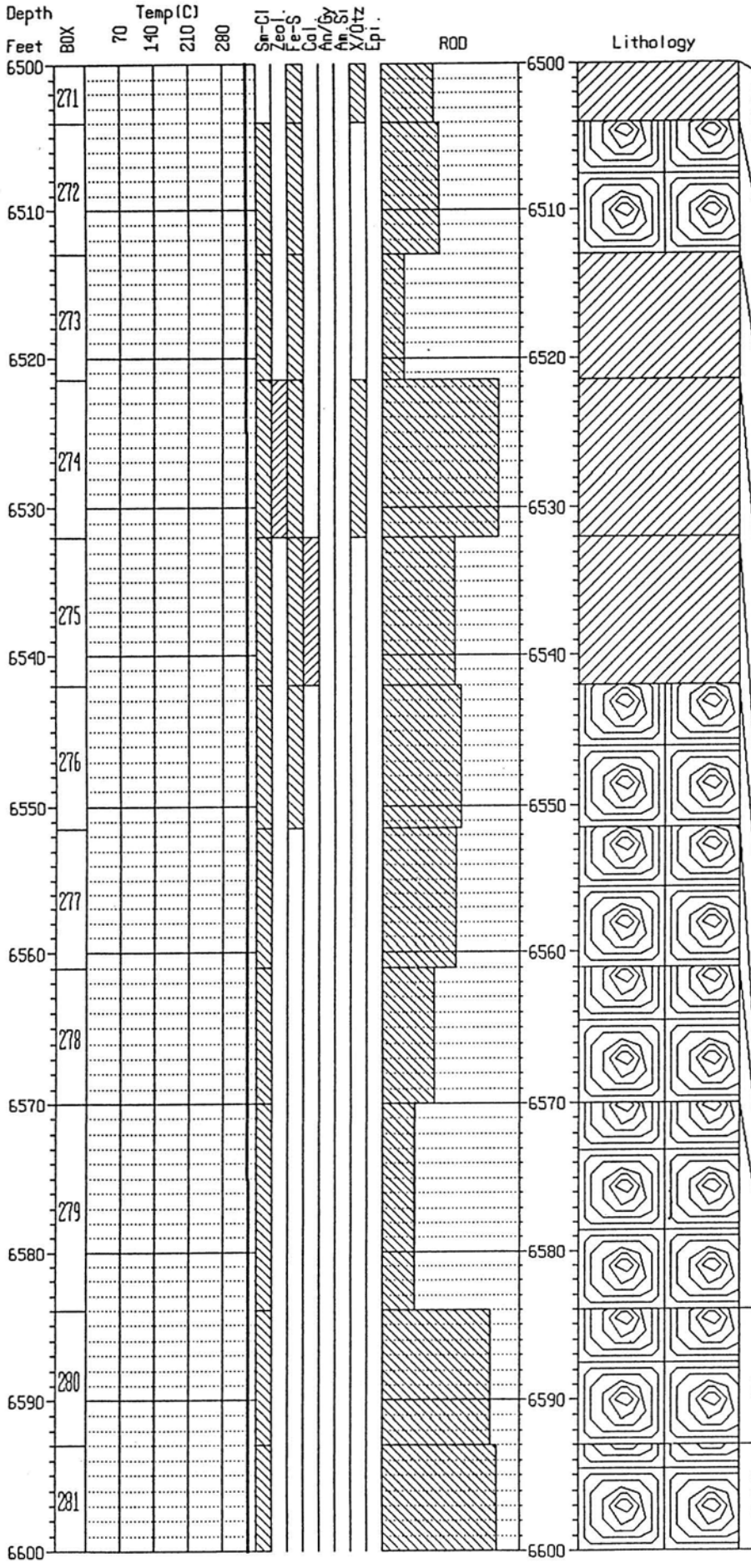


Descriptions

1), 3) DIKE, avesicular, aphyric, slightly diktytaxitic gray basalt; 13, 154 cm. 1<>2 = 90, 2<>3 = 60 degrees. 2) Pillow Lava, picritic, avesicular, 20% olivine phenocrysts "crazed" white, in a reddish gray matrix altered to smectite; 107 cm. Secondary Mineralogy: QUARTZ CRYSTALS, FE-SULFIDES: pyrite.

1), 2) Dike, avesicular, <<1% olivine microphenocrysts altering to clays in a gray diktytaxitic groundmass; 92, 30 cm. 3) PILLOW LAVA, highly altered, 5-7% olivine phenocrysts altering to dark clays in a gray groundmass; 165 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, pyrrhotite, SMECTITE-CHLORITE. XRD: random interstratified trioctal smectite-chlorite (80% chlorite).

1), 3) Pillow Lava, picritic, avesicular, 20% olivine phenocrysts altered to dark gray green clay in a matrix which degenerates to powdery smectite; 56, 17 cm. 1<>2 = 50, 2<>3 = 70 degrees. 2) DIKE, avesicular, aphyric slightly diktytaxitic light gray basalt; 132 cm. 4) Dike, avesicular, 15% plagioclase laths in a dark gray aphanitic matrix; 54 cm. Bottom dip = 60 degrees. Secondary Mineralogy: SMECTITE-CHLORITE, QUARTZ, FE-SULFIDES: pyrite, pyrrhotite.

1) DIKE, avesicular, 1% olivine phenocrysts altering to dark clays, <1% olivine-plagioclase intergrowths, 3-5% plagioclase laths altering to clays in a medium gray feldspathic groundmass; 218 cm. 2) Pillow Lava, highly fractured, 5% olivine phenocrysts replaced by smectite in a pale gray aphanitic to feldspathic groundmass; 41 cm. 3) Dike, <1% olivine microphenocrysts, <1% plagioclase laths and microphenocrysts in a gray aphanitic groundmass; 21 cm. Secondary Mineralogy: QUARTZ CRYSTALS, SMECTITE-CHLORITE, ZEOLITES, FE-SULFIDES: pyrite, pyrrhotite. XRD: low quartz + low albite + ?.

1) DIKE, avesicular, aphyric except last 60 cm. of unit shows small (1 mm) voids which may be plucked microphenocrysts, aphanitic light gray basalt; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE, CALCITE, FE-SULFIDES: pyrite and pyrrhotite.

1) Dike, avesicular, 5% olivine phenocrysts altered to green clay in a gray diktytaxitic matrix; 101 cm. 2), 4) PILLOW LAVA, picritic, 20% olivine phenocrysts and microphenocrysts "crazed" white or iridescent, in a dark gray matrix altered to smectite. Dark veins of matrix outlining olivine aggregates give the unit a "fishnet" appearance; 85, 102 cm. 3) Sill, lithology as in unit 1; 2 cm. Secondary Mineralogy: FE-SULFIDES: pyrite, SMECTITE-CHLORITE.

1), 2) PILLOW LAVA, lithology as in unit 2 above, 1 cm green clay at contact; 138, 152 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

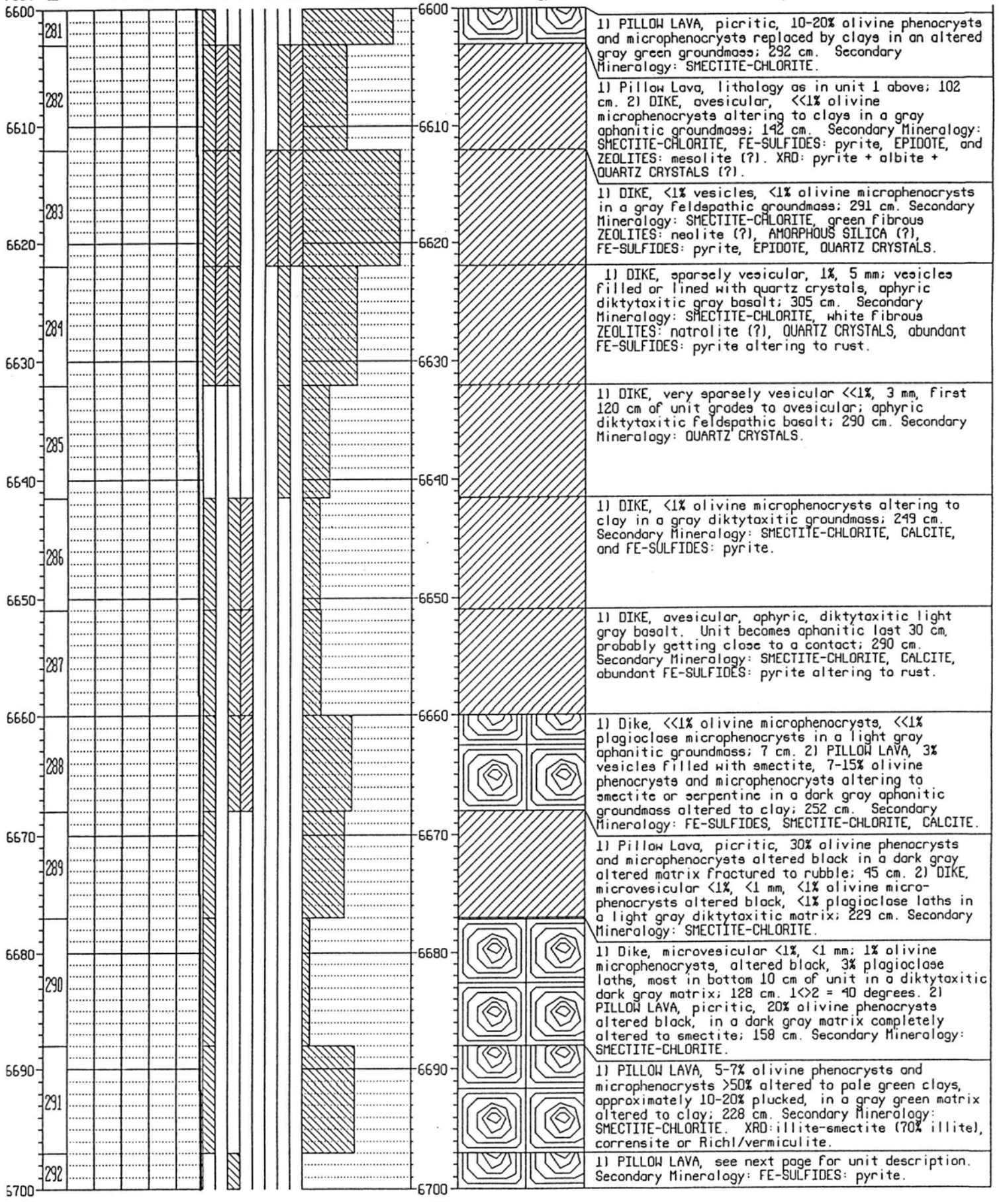
1) PILLOW LAVA, lithology as in unit 2 above. Voids present appear to be vesicles, not plucked phenocrysts; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, picritic, 30% olivine phenocrysts altered to black clay in a dark gray matrix altered to smectite. Box may contain more than one pillow unit but is too altered to see contacts; 305 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, picritic, 30% olivine phenocrysts and microphenocrysts "crazed" white with black aureoles, up to 1.6 cm diameter, in a gray-green matrix altered to smectite; 274 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

1) PILLOW LAVA, picritic, 10-20% olivine phenocrysts replaced by clays in an altered gray green groundmass; 292 cm. Secondary Mineralogy: SMECTITE-CHLORITE.

CATALOG OF SOH 2 CORE



SOH 2

Scientific Observation Hole
Site 2 Elevation 280 ft a.s.l.